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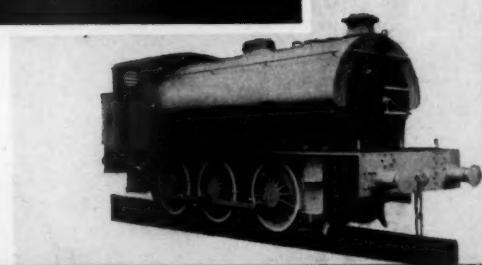
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Cheaper Steel

THE reductions in British steel prices effective from last Monday are encouraging, even although they average only a little over one per cent and will save consumers a total of only £10,000,000 a year; the saving to British Railways has not yet been estimated exactly, but must be considerable. The cuts are welcome for several reasons. They are the first reduction in these prices since before the last war. Steel is a basic industry, and reductions in its price will help in lowering production costs in a wide range of industries. Some of its most important users are the manufacturers of material for railways at home and overseas; supplies to the latter form a not inconsiderable share of exports from Britain. It is essential that any lowering of prices of manufactured goods made possible by that of steel prices be not stultified by wage increases. The steel industry moreover has set an example to others and shown what can be achieved through efficiency.

Although it is benefiting from both the fall in the landed cost of imported materials and the drop in its import requirements, it has been carrying the very substantial increases in home costs since steel prices were last adjusted in July, 1957. Some of the increased home costs have been offset within the industry by improved productivity, but the remainder has absorbed a considerable part of the industry's import savings. On the other hand, increased efficiency, including productivity, is largely the result, now being felt, of carrying out a sound capital investment programme. This is good news for British Railways, in that it shows that implementation of the railway modernisation programme could well have similar satisfactory results. One reason against nationalising steel, as the Labour Party threatens to do if returned to power, is the efficiency of the industry, of which the lowering of its prices is a further indication.

Wagons for Pakistan

THE fact that R. Y. Pickering & Co. Ltd. and Metropolitan-Cammell Carriage & Wagon Co. Ltd. have secured orders for the bulk of Pakistan Railways latest wagon requirements speaks well for the standard of British workmanship. Details of the order received by Pickering were recorded in last week's issue, and particulars of the remainder of the order appear elsewhere in this issue. It is understood that firms in the U.S.A., Canada, and Japan, and in France, Italy, and other European countries competed for the contract, tenders for which were invited some five months ago, but satisfactory completion of previous major contracts undoubtedly gave an advantage to the British firms. Pickering received in August, 1956, an order of the value of £1,500,000 for 1,100 wagons; these were delivered on schedule; and an order for 690 wagons received by Metropolitan-Cammell in July, 1952, also was completed to time. Another factor in favour of the British bids was the prices offered despite the ability of some Continental firms to offer long-term credits. These large orders show what can be achieved by British industry, especially when delivery dates are duly honoured.

Twenty-two "Deltics" for British Railways

AS reported in our Contracts and Tenders section, the British Transport Commission has placed an order for 22 main-line, 3,300-h.p. Co-Co "Deltic" diesel-electric locomotives from the English Electric Co. Ltd. Intended for use on express passenger services between Kings Cross, Leeds, Newcastle and Edinburgh, the locomotives will be generally similar to the prototype built by English Electric which has been operating on British Railways since November, 1955, while remaining the property of the company. It is the most powerful diesel design to be built for operation in this country. Power is provided by two 1,650-h.p. Napier "Deltic" engines. The prototype has an axle load of 18 tons on each of six axles, which results in a power: weight ratio of 72 lb. per h.p. Delivery of the 22 locomotives is planned to begin in 1960, and the Commission expects that by the middle of 1961 all the units will be in service on most of the Regions' principal long-distance trains. Allocation of the locomotives will be to Kings Cross (eight), Newcastle (six) and Edinburgh (eight). It seems that the diesels will be operated intensively, replacing 55 Pacifics of the "A4" or similar classes. They would seem to be well able to do this, as the prototype has recently been demonstrating on the London Midland Region. As reported in our issue of December 27, this unit has been working on a roster which has involved operating for 17 hr. a day and for six days a week. It was then running some 4,000 miles each week.

Opening Up Southern India

THE opening to traffic of the Quilon-Kottayam section of the 96-mile metre-gauge Quilon-Ernakulam line of the Southern Railway of India marks the completion of an important project to open up the relatively undeveloped southern extremity of the sub-continent. The

new line links Quilon, on the metre-gauge line from Madras, Trichinopoly, and Madura to Trivandrum, with Ernakulam, on the broad-gauge line from Madras and the North via Shoranur to Cochin Harbour. From Ernakulam there is access, by some eight route-miles of mixed gauge track, it is understood, to Cochin Harbour. The result will be not only a railway service for districts of the State of Kerala (in the former princely States of Travancore and Cochin) hitherto dependent mainly on inland water transport, but metre-gauge access to the port of Cochin from a large area. In addition, considerable traffic is expected between Travancore and the Malabar coastal area north of Cochin. A brief description of the construction, with an outline of the bridging and other problems involved, appeared in our issue of May 17, 1957.

The Burma Railways in 1955-56

THE report on the Burma Railways for the year ended September 30, 1956, which we have recently received from Maung Maung Gale, Commissioner of Railways, shows that the gross earnings totalled K.801.60 lakhs or K.13.29 lakhs more than in 1954-55. Working expenses including depreciation were K.718.92 lakhs, an increase of 9 per cent over those in the previous year. Net earnings were thus K.108.35 lakhs, but as interest charges amounted to K.25.67 lakhs, the year's surplus was K.82.68 lakhs. The introduction of better coaching stock was largely responsible for an increase of K.17.5 lakhs in passenger earnings, but goods earnings declined by K.10.7 lakhs. The most important events of the year were the rehabilitation and reopening of a 25-mile section of the Pyinmana-Kyaukpadaung, and 36 miles of the Ywataung-Ye U branch, both previously closed due to insurgent activities. This brought the total route-mileage operated up from 1,735 to 1,796, but there were still 241 route-miles of war-damaged lines remaining to be restored. The Daga bridge on the Henzada-Bassein line was reopened after reconstruction, leaving the only river gap still unclosed at the Sittang River on the Moulmein line.

Rolling Stock and War Damage in Burma

OTHER items of information embodied in the Burma Railways report referred to above included the building in Myitnge workshops of 27 new coaches for the Rangoon suburban service. Contracts were also placed with local firms for the construction of some 600 units of coaches and wagons and 70 bodies. From abroad seven restaurant cars and 39 corridor coaches were received; these were to form part of the diesel-hauled main-line expresses intended to be initiated as soon as the six diesel-electric locomotives on order from France were received. Two hundred and seventy-four covered, 174 open, and 100 timber wagons were also placed in service during the year. There were 25 cases of trains being mined (or bombed), derailed and/or ambushed, and 305 cases of sabotage of track, bridges and stations in 1955-56. There were also three ordinary accidents resulting in seven serious injuries. Altogether, of the 401 bridges that were waiting to be rebuilt or repaired, as a result of war or insurgent damage, 88 were restored. Twenty-seven miles of the main line were relaid with 75-lb. in place of 60-lb. rails.

Material for Chinese 50-Cycle Electrification

THE experience gained in 50-cycle electrification of the French National Railways has naturally directed attention to the development in France of 50-cycle techniques—though Germany, not France, was the cradle of this form of traction. The French Government, the S.N.C.F., and French industry have been active in arranging for French technical assistance to be made available for electrification in India and elsewhere, to the benefit of all concerned, not excepting French suppliers of locomotives and other material. It is not surprising, therefore, that a Chinese trade mission which recently visited France should have decided, according to reports, to purchase electric locomotives from French builders and to enlist the

services of French technical staff in conversion of the Chinese National Railways at 50 cycles. Details are lacking, but it does not seem that as much French technical advice or supervision is to be given in China as is being given in India. The British electrical industry and British Railways now have much to show in the field of a.c. electrification, which is making rapid progress in this country. Inspection of this can be of the utmost interest and profit to visitors from China, who might well take the opportunity also to renew the former, mutually advantageous links between Chinese railways and other branches of the British railway equipment industry.

New Station for Gatwick Airport

A NOTABLE feature in the development of Gatwick Airport is the concentration of road and rail passenger and parcels facilities on the air terminal building. The main concourse of this building straddles the diverted London-Brighton Road and access is gained by a ramped flyover system or by a staircase leading from the railway station forecourt. The station, now being built partially on the foundations of the old Gatwick Racecourse Station, on the electrified London-Brighton main line of the Southern Region, is linked directly with the terminal concourse by an overbridge extending over all platforms. Railway passenger traffic will not be confined to those travelling by air, although the only access to the station is from the air terminal building. It will continue to handle an appreciable volume of season ticket holders resident in the vicinity. The imaginative planning of the station appears to spring from the bitter experience with London Airport, which is still without effective rail communication. Ticket and information offices are located in the main concourse, and a parcels office is situated underneath the concourse. This close association of air, rail, and road is said to be unique; it will, no doubt, be considered essential in similar schemes in the future.

The Basis of Sound Staff Relations

SELDOM has the fundamental problem of staff relations on the railways been outlined so clearly, with practical suggestions for overcoming some present difficulties, as in an essay "The Human Element in the Railway Industry," of which an abstract is published on page 402 of this issue. The essay gained the premier award in the annual competition arranged by the British Railways (Southern Region) Lecture & Debating Society, and rightly received high commendation from the judge. We have taken the unusual course of summarising it in our columns. Considerations of space normally restrict us to editorial comment on the papers given to bodies concerned with railways, engineering, and allied subjects by men who have risen high in their calling or are acknowledged as experts; nor are most papers submitted to railway debating societies and the like of sufficient interest or of a technical standard high enough to interest our readers. The paper now under consideration is of exceptional merit, especially in its suggestions for recruiting and training young entrants to the railway service; as such it is worthy of the attention of railwaymen of all ranks.

European Accelerations in 1958

THE summer of 1958 promises to show some of the most notable advances in the speed of European railway travel that have taken place in any single year since the war. They have been made possible partly by additional electrification; another factor has been the increasing practice of conducting frontier formalities in the trains. In our issue of November 1, 1957, some important timetable developments were outlined. Details now available show that these were only a few of the changes which will result in the speeding up of some international trains by well over 2 hr. There will be new fast streamline services also, such as the "Transalpin" between Vienna and Zürich by the Arlberg route, with its journey time of between 11½ and 11¾ hr. There are to

be considerable developments also in the countries behind the Iron Curtain, such as the "Vindobona" express between Berlin and Vienna via Prague in just over 12 hr. An article elsewhere in this issue makes it clear that Europe is far from seeing the recession in long-distance passenger traffic that is taking place in the U.S.A.

Westinghouse and the Railways

THE long association which the Westinghouse Brake & Signal Co. Ltd. has maintained with the railway industry was stressed by the official visit of the Institution of Locomotive Engineers to the company's Chippenham Works last Friday. A brief description is given in this issue. Production seen on the tour included components which have given many years reliable service on railways, both home and abroad, and enhanced the reputation of the company for products which are robust, reliable, and well designed. Of these, the DH25 two-cylinder, single-stage compressor, which is standard for Southern Region multiple-unit electric stock, including that being built for the Kent Coast electrified services, is an example; this unit, first introduced over 25 years ago, is basically unchanged. At the same time, the company is developing new types of equipment such as the Westronic transistorised C.T.C. system. A demonstration model of this equipment, which is still under development, was also seen by members of the Institution. Developments such as this should continue to ensure that the name of Westinghouse retains its high position amongst suppliers of railway material.

New British Standard for Diesel Engines

AFTER lengthy deliberation by a committee representative of British users and manufacturers of diesel rail traction engines, the British Standards Institution has published B.S. 2953 "Diesel Engines for Railway Traction." In general, the new standard accords with the principles laid down in "Rules for Diesel Engines of Traction" issued by the International Union of Railways, of which the B.S.I. is a member. The specification covers engines for all duties, from high-speed main-line locomotives to heavy duty shunters. The 100-hr. test cycle specified is probably the most representative test yet produced. It is sometimes argued that a type test of this duration is insufficient to reveal any weakness of design. On the other hand, a 1,000-hr. test is expensive and the cost will eventually be borne by the purchaser. The acceptance tests are considered sufficient to prove that each engine conforms to the consumption and other characteristics given on the relative type test certificate.

High-Speed Finale

BEFORE the last war the German State Railway operated a considerable network of high-speed business services from leading cities to Berlin in the morning, with a return in the evening. End-to-end speeds were as high as 77 m.p.h. over distances of 170 miles and more, with start-to-stop averages up to 82.3 m.p.h. Almost all of these were operated by two-car 820-b.h.p. and triple-car 1,200-b.h.p. diesel-electric and diesel-hydraulic streamlined trains, beginning with the "Flying Hamburger" in 1933. A few steam units, however, were built, principally the three streamline 4-6-4 tender locomotives, one of which attained the German steam record of 202 km.p.h. (125 m.p.h.), and also the Henschel streamline 4-6-4T locomotive which hauled the fixed-formation Wegmann streamline train over the Berlin-Dresden route and attained 175 km.p.h. (109 m.p.h.). Within the last few months all four of these high-speed steam locomotives have been withdrawn, largely because spares for them were non-standard; and within the same period the original "Flying Hamburger" twin-car train has also been withdrawn, though quite a number of the pre-war triples of Classes "VT.06" and "VT.07" are in daily long-distance fast services, but rebuilt with the remarkable Maybach "tunnel" engine, which runs 1,000,000 km. between heavy overhauls.

The Dilemma of the B.T.C.

IN reply to Parliamentary Questions, the Minister of Transport & Civil Aviation, Mr. Harold Watkinson, published last week a letter written in October, 1957, in which he informed the British Transport Commission that a limit was to be imposed on Treasury advances to be made on account of 1957 and 1958 to meet the deficits incurred by British Railways. The Transport (Railway Finances) Act, 1957, authorised advances to a total of £250 million plus interest for these purposes for the years 1956-62. No restriction was imposed as to the amount that could be advanced in any one year. Only the total of advances over the period was limited.

In his letter, however, Mr. Watkinson imposed such a restriction. He wrote that "for 1958 and 1959 no advance will be made to the Commission above the level contemplated in the White Paper. For 1958, therefore, the amount will not be in excess of the actual ascertained deficit for 1958 as certified by the auditors in due course. For 1959 the advance will be reduced in accordance with the forecast on which the White Paper is based." It would appear, therefore, that the advance for 1959 is to be limited to the amount estimated when the Commission prepared its estimates in 1955-56, which were published in "Proposals for the Railways" in the autumn of 1956.

As the Minister in his letter implies that the deficit for 1958 is expected to exceed the White Paper estimate, all that this can mean is that any excess over that amount cannot be met by Treasury advance under the Act but will have to be carried forward in the Commission's ordinary accounts. This would appear to defeat the purpose of the Act, which was to transfer deficits incurred during the transition period, during which modernisation was to take place, to a special account, so that the Commission would not have an unmanageable deficit on its revenue and expenditure account by the time it was estimated to break even in 1961-62. By placing deficits to a special account it was presumed that they could be liquidated over a long period in the 1970s and current operations would not be hampered by a large debit balance on current account. If the Commission is now to be compelled to carry forward on current account that part of its deficit which exceeds the White Paper estimates, and the balance as estimated on a special account, not only will some of the benefits of the arrangements under the 1957 Act be lost but its accounts will be unnecessarily complex and confusing.

The Minister's intentions seem clear. First, he wishes to encourage the Commission to resist wage demands; and second, to stimulate it to strive to hold its losses to the estimates. Unfortunately both may prove pious hopes. Not only have costs, including wages, risen, but traffics have been extremely disappointing. There are indications that losses are continuing on a greater scale than any foreseen in the White Paper. The latter, however, did not give figures of anticipated losses year by year but simply included a graph which indicated that deficits would reach a maximum in 1957-58 and then slowly diminish, reaching equilibrium by 1961-62.

This might have proved possible but for two adverse factors arising out of Government policy. The first is the retardation of the capital investment programme, which must delay the day when results from modernisation increase revenues sufficiently to bring the break-even point into view. The second is the denial to the Commission of the ability to offset higher costs with increased charges. It may well be that to a large extent higher fares and freight charges would result in loss of some traffics; but that should be for the Commission to judge. The Minister himself has stated that higher charges are ruled out as a means of meeting a higher wages bill. On the very day that the award on the London busmen's claim was announced Mr. Watkinson stated that he had previously made it plain to the London Transport Executive that higher wages could not come from higher fares. As he was speaking only a few days before the hearing before the Railway Staff National Tribunal of the railwaymen's

claims, and drew attention to his letter to the Commission referred to above, he has made it plain that the same restriction on higher charges applied to British Railways also.

The Commission is in a difficult position. At the same time as it is told that it must not increase charges to offset higher costs in an attempt to balance its revenue account, or at least to keep within the limits of the estimated losses of the White Paper, it is informed that if it does exceed its estimated losses no additional help will be coming from the Treasury. The advice is somewhat contradictory, or at any rate inconsistent, in that it may neither incur greater losses nor take the necessary steps to prevent their being incurred.

When the present Government formulated its transport policy after assuming power in 1951 and incorporated it in the Transport Act of 1953, it professed the sound principle that the railways must be given the maximum possible flexibility and be left free to operate commercially within a competitive transport system; that presupposes freedom from external interference, that freedom unfortunately has been largely denied them.

Soil Mechanics on British Railways

IN scientific methods of research and development British Railways and their immediate predecessors have shown remarkable advances of late years, not least in the field of civil engineering. In particular, their personnel and equipment for dealing with problems of foundations for structures and earthworks and the stability of cutting, bank and tunnel soils is now extremely efficient. On several occasions we have referred to the scientific approach to the problems involved in such works as the drainage of Hildenborough and the repairs to Twyford cutting, Bo Peep (St. Leonards) and other tunnels, and, as recently as our March 21 issue, the Barking works. In fact, no engineering works on these railways involving soil mechanics are now undertaken without reference to the research section, and its investigations carried out in connection with every work under the vast modernisation scheme have proved and are proving invaluable.

Fresh evidence of the scope of this research work is provided in a lecture entitled "Soil in British Railway Civil Engineering" given on March 31 by Mr. A. H. Toms, of British Railways Research Department, Derby, to the Society of Engineers. It gives a good idea of the scientific study of soil as an engineering material and its effect on the approach of railway civil engineers to their varied problems. Normally they are concerned not with hard but with soft rocks or soils, whether granular and non-cohesive—such as gravel, sand, and true silt—or cohesive soils containing sufficient clay to bind their particles together; and so the lecture deals only with soft rocks.

After explaining the reasons for the glutinous properties of clay and for the extent of their compaction depending on the shape and roughness of their particles, Mr. Toms deals with their shrinking, swelling and softening properties depending on the volume of water in their pores. The strength of clay in compression or shear, is shown to be not merely a function of the character of the clay mineral—giving a certain angle of repose—but is largely a matter of the degree of separation of its particles by water in the pores between them. The properties of the principal soils encountered in civil engineering are also outlined.

The lecturer then considers *seriatim* the various tests carried out with modern scientific equipment to obtain information regarding such matters as resistance to penetration in sandy soils, and the shear strength and moisture content in clays to ascertain the cohesive strength and angle of internal friction in them. Other tests in general use include the measurement of permeability of soils, the rate of subsidence in compressible soil, and consolidation tests to estimate the amount and rate of settlement in earthworks. The Procter test is made to determine the behaviour of a fill compacted at any given moisture content by mechanical plant.

Typical cutting and embankment slips and their causes are quoted, and also the failures of embankment foundations due to too-rapid loading. Problems of resistance to the overturning of foundations are solved by stage-by-stage photographs showing the sand movement round a model foundation. These model tests made by the Southern Railway Research Section verified theoretical predictions that the deepest foundations were the most effective for a given volume. Incidentally, they inspired the use of a power-auger fitted to a special train on the London Midland Region to bore holes for the concrete foundations of masts to carry overhead electric catenary lines. These works were described and illustrated in our issue of October 4, 1957.

Pile and pier foundations, earth-retaining structures, and tunnels are also included in the remarkably wide scope of this lecture. It concludes with some instructive notes on the application of soil mechanics to the modernisation scheme.

The widening of existing and construction of so many new embankments, cuttings, bridges, and tunnels are necessitating a great volume of preliminary geological and soil mechanics investigations. Existing earthworks are surveyed to show their profiles and past behaviour, and soil samples both from them and from virgin ground are tested to furnish such information as the following: the economic slopes for new banks and cuttings; the suitability or otherwise of soil from cuttings for use in banks; the compaction techniques necessary to secure long-term stability; the ability or inability of virgin ground to support new banks; the likelihood of pore-pressure developed during embankment-building limiting speed of construction or demanding special drainage; probable pressures on retaining walls and tunnel-linings; need for catchwater drains on tops of cuttings or beside tracks; type and depth of track sub-ballast material required; type, depth and permissible bearing pressure on foundations of bridges and other structures; draining existing bank slips or stabilising them with sheet-piling before widening bank; and selection of top soil and suitable grasses to protect slopes from soil erosion.

Western Region Summer Passenger Timetable

THE principal improvement in the forthcoming summer train services of the Western Region, operative from June 9, will result from the introduction of diesel multiple-unit trains between Birmingham and Cardiff via Worcester and Hereford, and between Shrewsbury and Hereford; over both lines the increase in the number of trains and in their average speed is to be considerable.

Between Birmingham and Cardiff the intermediate stops of the fast trains in general will be Stourbridge Junction, Kidderminster, Droitwich, Worcester Foregate Street, Malvern Link, Great Malvern, Colwall, Ledbury, Hereford, Abergavenny, Pontypool Road, and Newport, and the overall time $3\frac{1}{4}$ hr. The existing 8 a.m. from Birmingham will be accelerated 15 min.; the 9.45 a.m., which will start at 10 a.m., 16 min.; the 12 noon will be a new train in 3 hr. 10 min.; the 1 p.m., also in 3 hr. 10 min., will be speeded up by 44 min.; the 5.40 p.m., which at present terminates at Malvern Wells, will replace the old 5 p.m. with an acceleration of 40 min. and be provided with a buffet car. The 8 p.m. will be another new service, as also will be the 7.50 a.m. from Hereford to Cardiff, the latter with buffet car facilities. There will be similar improvements in the reverse direction.

Between Shrewsbury and Hereford there is to be a complete transformation of the existing timetable. Passenger service is being withdrawn from all intermediate stations and halts except Church Stretton, Craven Arms, Ludlow, Woofferton Junction, and Leominster, and the new diesel trains will cover the 51 miles in 75 min. inclusive of all these stops, except that at Woofferton, which is to be made by two of the diesels in each direction only, other stops being made by Ludlow-Tenbury branch trains.

Compared with the existing stopping trains from Shrewsbury at 6.25 and 10.10 a.m., 1.15, 3.55, 6.55 and 8.22 p.m.,

averaging 110 min. on the run, there will be trains at 7.0, 8.50, and 10.40 a.m., and 1.15, 3.5, 4.5, 4.50, and 6.40 p.m.; also at 8.30 and 10.30 p.m. to Ludlow, besides the non-stop North to West expresses, including the recently introduced 7.50 a.m. from Birkenhead to Cardiff. Of the new diesel trains, the 7.0 and 8.50 a.m., 1.15 and 4.50 p.m. will have buffet cars, and the 7.0 a.m. and 4.50 p.m. will run through to Cardiff. Certain of these trains will make good connections at Hereford with the new Birmingham-Cardiff service, and will also serve as feeders to trains from the North to the West of England. Northbound, the new diesels will leave Hereford at 7.5, 8.10 and 10.45 a.m., 12.15, 3.0, 4.45 and 6.45 p.m., all but the 8.10, 12.15 and 4.45 with buffet cars, and the 8.10 a.m. through from Cardiff at 6.40 a.m.

Elsewhere in the Western Region there will be few changes in the summer service of 1957. The "Cornishman" will run in two parts daily; the main train, at 9 a.m. from Wolverhampton, will be non-stop from Bristol to Plymouth, reaching Penzance at 5.40 p.m., 27 min. earlier than now, while the Torbay section will run 10 min. later, make the Taunton, Exeter and Newton Abbot stops, and be accelerated 10 min. In the opposite direction the "Cornishman" similarly will run non-stop from Plymouth to Exeter and reach Wolverhampton at 7.3 p.m., 22 min. earlier, the Torbay portion following from Newton Abbot in the present times.

The "Devonian" is to be speeded up by 25 min. on the L.M.R. portion of its run, leaving Bradford at 10.15 instead of 9.50 a.m., and by 17 min. northbound, arriving at 6.43 instead of 7 p.m. On Fridays the 6.10 p.m. from Paddington to Birkenhead is to be relieved regularly by a 6.8 p.m. restaurant car train to Wolverhampton, but this will be allowed as much as 136 min. for the non-stop run of 110.6 miles to Birmingham. The easily-timed 8.10 p.m. from Paddington to Shrewsbury is to be accelerated by 10 min., though still allowed 2 hr. 21 min. to Birmingham; and the up "Inter-City" (5 p.m. from Birmingham) will be due in Paddington at 7.10 p.m., 5 min. earlier.

South African Railways in 1956-57

THE report of the South African Railways and Harbours administration for the year ended March 31, 1957, has now been received from Mr. D. H. C. du Plessis, General Manager. It shows balances in the net revenue accounts of all services under the administration as follows: Railways, £808,804; Harbours, £2,310,087 Steamships, £170,843; and Airways, £839,285; a total from all sources of £4,129,019. However, appropriations against this total net revenue were: £5,000,000 for the betterment fund; £1,200,000 as a special contribution to the renewals fund; and £60,000 towards reducing the deficiency in the pension fund. These appropriations therefore exceeded the net revenue by £2,130,981 and this deficit was charged to the rates equalisation fund.

The figures for the railways, including road transport and other ancillary services, are given in the table of principal results below:—

	1955-56	1956-57
	Thousands	Thousands
Passenger journeys	262,165	267,795
Goods tonnage	65,253	64,685
Passenger train-miles	22,212	22,075
Mixed train-miles	7,250	7,324
Goods train-miles	63,515	65,606
Total train-miles	92,977	95,005
Total freight ton-miles	17,441,649	17,129,192
Passenger receipts	19,193	19,071
Parcel & mails receipts	4,507	4,606
Goods, coal & livestock receipts	106,087	107,637
Miscellaneous receipts	8,022	8,102
Total receipts	137,809	139,416
Working expenses	78,559	92,173
Depreciation	7,754	8,355
Total expenditure	86,313	100,529
Surplus	51,496	38,888
Interest and other charges (net)	41,020	38,079
Balance, railways	10,476	809

Railway revenue increased under all heads except

Passengers and Coal as compared with 1955-56, but there was a serious increase in expenditure and the ratio of expenditure to earnings rose from 62.63 to 72.11; this was due almost entirely to enhanced salaries and wages. The total tonnage of all classes of goods traffic moved during the year was 75,031,624 tons, a new record and 448,656 tons higher than in the previous year. There were several reasons for this relatively small increase. Though the modernisation and expansion programme was most satisfactory and ahead of schedule, few of the additional facilities were available in either this or the previous year. In fact, such works as the doubling and realignment of the Natal main line were producing unavoidable bottlenecks.

Moreover, although the track capacity of some lines had been substantially increased, the combination of a shortage of engine-power and an increased average length of haul adversely affected the turn-round of wagons.

The 5,630,003 increase in the total number of passengers carried was accounted for by an increase of 6,260,340 in suburban passengers, there being 630,337 fewer long-distance travellers.

The route-mileage of line owned by the South African Government and open for traffic on March 31, 1957, was 13,441, a figure smaller by 12 miles than a year earlier, due to route-shortening by realignments. In addition, the administration operated 580 miles of the Rhodesia Railways and 32 miles of private railways.

During the year under review 30 "25 Class GMAM" and five "Class GMA" steam and 31 "5E" electric locomotives were placed in service. In fact, an additional 2,074,815 lb. tractive force became available, materially reducing the difficulties in moving the traffic offering. A further 71 steam, 202 electric and 135 diesel locomotives were on order at its close.

A major portion of the report is devoted to a résumé of the progress of the S.A.R. during the past decade. In that period the revenue from the railways increased by 108 per cent, but expenditure rose by 103 per cent. Though the total tonnage carried increased by 42.6 per cent, engine-power (tractive force) went up by only 22 per cent, a satisfactory comment on the operating efficiency. Altogether 635 steam and 137 electric locomotives, 831 coaches, and some 60,000 wagons had been placed in service in the ten years to March 31, 1957; meanwhile there were 279 route-miles of electrified line added by conversion from steam traction.

Some of the major engineering work completed during the decade were 475 route-miles of doubling, 11 miles of quadrupling, five new marshalling yards and 445 route-miles of electrification either completed or in hand at the end of the period. Many extensive works upon improved communications, signalling, housing, workshops and track-strengthening to carry heavier rolling stock were also undertaken.

Impacts and Claims

THE campaign to reduce loss and damage to merchandise in transit is one that has to be waged on many fronts, and by all forms of transport. British Railways can claim to have achieved some measure of success, though higher prices increase the cost of claims. U.S.A. railways have long waged campaigns, such as "perfect shipping months" and so on, but the claims figures, in spite of every effort, reflected a 10 per cent rise for the first six months of 1957 over the corresponding period of 1956, mainly because of higher prices.

Much attention has been directed recently to the effects of impact on the structure of freight rolling stock and loads carried. A paper of considerable interest was read not long ago to the Canadian Railway Club in Montreal, on this aspect of the problem. Its author, Mr. K. L. Selby, of a Cleveland engineering company, expressed the view that, because of the better riding characteristics of bogies used with modern rolling stock, damage to loads had been largely eliminated in respect of vertical and lateral shocks, assisted by improved methods of loading; but that much damage was still being caused by longitudinal impacts. Films exhibited at the Canadian Railway Club meeting

dealt respectively with the question of impact and damage to the freight being carried; the former related primarily to the structural behaviour of freight cars after impact at varying velocities, and the latter covered the comparative efficiency of various cushioning devices.

A point made in this address was that since 1917 the average freight train speed on American railways had increased by almost 80 per cent, the average number of wagons per train by nearly 90 per cent, and the average tractive effort per locomotive by practically 95 per cent. Whereas it was generally agreed that impacts limited to 4 m.p.h. in shunting yards were not likely to cause serious damage, that speed, under present-day conditions, was quite often exceeded. Some months ago, at a railway meeting in the State of Washington, attention was drawn to the availability of a new form of impact graphmeter which could be fixed to the exterior of a freight car, thereby enabling yard staffs to make a visible check from time to time to see whether the car was being roughly handled.

C.I.E. in 1956-57

WE have received from Mr. T. C. Courtney, Chairman of Coras Iompair Eireann, a copy of his board's report for the year ended March 31, 1957. It shows a loss of £1,723,209 (£1,625,542 for 1955-56), of which £1,013,667 (£1,223,222) was lost on railway operation. Though railway passenger receipts rose by £105,475 during the year the number of passenger journeys were fewer by 647,894. On the other hand, goods and livestock receipts fell (by £137,169) as also did the volume of this traffic. The reduction in the number of passengers carried was caused by the 1955 summer being very much finer than 1956. The decrease in goods traffic was the result of a smaller volume of merchandise carried, though there was also some reduction in coal traffic. There was, however, an overall reduction in the loss on railway working of more than £200,000 after making increased depreciation provisions for the additional diesel units in traffic.

The following are some of the principal results of working the C.I.E. as a whole:—

		1955-56	1956-57
		£	£
<i>Railways—</i>			
Passenger receipts	...	2,633,315	2,795,631
Goods	...	4,052,611	3,915,422
Miscellaneous	...	51,484	50,575
Total	...	6,737,410	6,761,648
Expenditure	...	7,960,632	7,775,315
Loss	...	1,223,222	1,013,667
<i>Road Passengers—</i>			
Receipts	...	5,326,014	5,546,948
Expenditure	...	4,645,650	4,946,598
Profit	...	680,364	600,350
<i>Road Haulage—</i>			
Receipts	...	1,847,745	1,707,777
Expenditure	...	1,765,120	1,643,746
Profit	...	82,625	64,031
<i>Canals, loss</i>	...	65,122	59,625
<i>Docks & Harbours, loss</i>	...	9,735	8,556
<i>Hotels, Refreshment Rooms & Restaurant Cars, profit</i>	...	28,892	38,288
Total loss	...	1,625,542	1,723,209

The first point made in the report was the good progress during the year in the change over from steam to diesel traction. By March 31, 1957, the principal passenger and goods trains were diesel-hauled. The fall in first-class travel continued, and on June 3, 1956, the designation "third class" was changed to "second class," but without any alteration in fares. Passenger fares were increased by 10 per cent as from February 1, 1956, this accounting for the enhanced receipts despite the decrease in traffic. From January 1, 1957, through fares were introduced between C.I.E. and B.T.C. stations. A striking concession was the issue of special week-end tickets at single fare for the return journey during two periods of the year.

The following new coaching stock was placed in service during 1956-57:—15 main line second-class bogies; 10

suburban composite bogies; five heating vans for use with diesel locomotives; 12 parcel vans; and four railcars. The coaches are of light-weight design with new-type underframes, cast-steel bogies and roller-bearing axleboxes. The heating vans complete the programme of 41 of these vehicles. The four railcars were built at Inchicore and are part of an order for six. Additions to goods stock during the year under review were 524 wagons and 200 cattle wagons. Lightweight diesel units were introduced for merchandise train services on the Banteer-Newmarket, Gortatlea-Castle Island, and Clara-Banagher branch lines, the first two of which had been closed to regular merchandise services for some time.

Nineteen miles of track on the former narrow-gauge Tralee and Dingle line were dismantled and removed during the year, at the end of which the route-mileage open for traffic was 1,918. The backbone of the new telecommunication system was brought into use by the installation of tie lines between Dublin and Cork, Limerick, Waterford, Athlone, and Mullingar, including teleprinter equipment. The production of pre-stressed concrete sleepers was continued as they were giving satisfactory service. Experiments on steel reinforcement and fastenings for concrete sleepers also continued at Inchicore. Work on the remodelling of Dun Laoghaire station and yard—described in our issue of October 18, 1957—made good progress during 1956-57.

During that year 38 diesel-electric and three diesel-hydraulic locomotives were placed in service, and at its close there were 78 of the former, three of the latter, and three diesel-mechanical units in traffic. The steam locomotive stock was reduced by 35 engines of all types.

Letters to the Editor

(The Editor is not responsible for opinions of correspondents)

Long-Distance Passenger Travel

March 9

SIR,—I refer to Mr. D. Coombe's letter published in your March 7 issue. He refers to the number of main-line trains which are crowded at weekends, and in which passengers, particularly those joining intermediately, have to stand.

I often wonder if every effort is made by the authorities to ensure that all vacant seats are made available. It is common for passengers to place packages on seats, oblivious of the luggage racks provided, and so give the impression that the seats are occupied. The average Englishman dislikes making a scene or asking sprawling passengers to close up and allow four people to sit down in the space which can accommodate that number. Years ago, small labels were fixed above the seats on each side of a compartment (corridor stock) stating "To seat four" or "Four seats"; these notices seem to have been dispensed with for some time past. Many travellers think that only three persons can be accommodated each side, particularly in compartments with movable armrests. The notices might well be re-introduced. If, when a ticket inspector finds that in a compartment seating eight, less than that number of tickets, and people are standing in the corridor, he should tell those passengers that seats are available. Adequate publicity does not seem to have been made to the effect that heavy luggage should be placed in luggage vans, and that as long as it is within the allowances, no extra charge is made for it going in that vehicle.

Although journeys by long-distance motorcoach take longer for similar distances than by express train, many people are attracted to the coach because, having booked, they are guaranteed a seat; and there is a certain personal touch in the coach driver being responsible for his own small number of passengers.

Yours faithfully,

A. H. SPRING

15, Argyle Road, Reading

THE SCRAP HEAP

Fare Unchanged Since 1882

A ride still costs only 5 cents on the Fenelon Place inclined railway in Dubuque, Iowa. The fare has remained unchanged since 1882.

Priceless

The late Henry Ford is reputed to have tried to buy, for his museum at Greenfield, near Detroit, the original *Rocket* from the Science Museum at South Kensington. He then had a replica built, which is preserved at Greenfield amongst old American locomotives, part of an extensive collection illustrating the history of transport.

Caledonian Blue Re-Appears

A famous locomotive of 70 years ago, 4-2-2 No. 123 of the former Caledonian Railway, has emerged from retirement in St. Rollox Works, where it has been preserved, and is to haul special trains for railway enthusiasts in Scotland. Built by Neilson & Company in the remarkably short time of 66 days, this locomotive was sent to the Edinburgh Exhibition of 1886 before going into main-line service. Two years later, it achieved remarkably high speeds with the West Coast train during the "race" to Edinburgh. Its subsequent duties frequently included that of pilot to the Royal Train, and latterly it was used to haul the directors' saloon. No. 123 passed to the L.M.S.R. on grouping in 1923, and was withdrawn from service in 1935. It has been repainted in

Caledonian blue livery, and made its first re-appearance on March 18, with a train of two coaches, also restored to pre-grouping colours, which conveyed a Press party from Perth to Edinburgh Princes Street; the party had made a tour of the Highlands, at the invitation of the Scottish Tourist Board, before attending a conference for the Edinburgh Festival of Music & Drama.

"Water Trains"

On the subject of British Waterways experiments with a floating container, briefly described on page 351 of our March 21 issue, it is pointed out in a recent letter to *The Times* that "the floating box idea is, of course, an adaptation of the 'Tom Pudding' boats used on the Aire & Calder Canal in trains of 20 or 30. The word 'water' could be omitted with perfect propriety; trains (of boats) were in use before the 'railway train' was functioning."

Fewer Locomotives : More Coal

A marked upward trend is shown in the coal consumption figures of the Japanese National Railways for 1956, despite the withdrawal of 113 steam locomotives during the year. Previously, the amount of coal consumed by steam locomotives has been steadily decreasing year by year, mainly because of the expansion of electrification and the increase of diesel traction, replacing steam operation. The upward trend in coal consumption, from 4,861,000 tons

to 4,993,000 tons, reflects increased train-miles operated.

Sesquipedalian Titles

Some transport enthusiasts in the U.S.A. appear to favour lengthy and quasi-classical titles for their activities. One magazine is called *The Ferro-equinologist* (lover of the iron horse). Collectors of transfer tickets have for many years called themselves *peridromophilists*, and transit-token collectors describe themselves as *vecturists* (from the word *vectura*, meaning a carriage or conveyance).

First West-End London Terminus

(See our March 28 issue)

On Saturday the ceremony of opening the West-End & Crystal Palace Railway took place, in the presence of the chairman and directors of the company, the leading men connected with the Crystal Palace, the chairman and several of the directors of the London & Brighton Railway, and many other gentlemen. . . . The result of the change to the inhabitant of St. Martin's-in-the-Fields or Westminster simply is that he now has a choice of evils if he wishes to go to the Crystal Palace. He can go by water from Hungerford or Westminster either to London or Chelsea Bridge, and thence be conveyed to the Palace by rail, as he may elect.—From "The Times" of March 29, 1858.

Any Moment Now!

Some railwaymen seem fond of automation;
Others regard it with some trepidation;
Some seem to live in an ecstatic dream
Of diesels and electrics; some like steam.
What fills the managerial breast with joy
Others find calculated to annoy,
And yet, in spite of seeming differentials,
We're all about the same, in the essentials,
And, what is more, about this time of year,
Experience has made it all too clear
That we, indeed, are one big family,
United in a common misery.

One day, bemused by changing rates and fares,
Our railwayman comes home, to find
the chairs
Stacked in some neutral corner, while
the ceiling
Informs him that the annual "certain
feeling"
Is manifest once more in his domain
And home will never be the same again.
For, when the mistress of the habitation
Becomes "The Lady of the Decoration,"
As, any moment now, it may befall,
Spring-cleaning doth make cowards of us all.

A. B.

Diesel-Electric Traction at the A.S.E.E. Exhibition



Mock-up of cab of 1,250-h.p. diesel-electric locomotive, built by Brush Traction Limited for the Eastern Region of British Railways, at the Electrical Engineers Exhibition in London last week

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

RHODESIA

Main-Line Track Re-laid

The re-laying of 1,246 miles of main line from Umtali through Salisbury and Bulawayo to Ndola with 80-lb. rails has recently been completed.

A start was made on the replacement of the old 60-lb. rails on the section between Salisbury and Hunters Road in 1936, and apart from interruptions caused by the war and post-war world-wide steel shortage, work has gone on ever since.

Apart from the main line, the 42-mile section from Nkana-Kitwe to Chingola is also being equipped with 80 lb. rails. Work on the 49-mile Somabula to Bannockburn section was completed during January.

FRENCH WEST AFRICA

New Bridge at Abidjan

A new double-deck road and rail bridge has been opened between Abidjan and Treichville, on Petit Bassam Island. A double-track line of the metre-gauge Abidjan-Niger Railway is carried on the lower deck.

NIGERIA

Processed Timber Sleepers

An advance in the field of timber preservation has made it possible for the Nigerian Railway to use local timber for sleepers for the first time. A British company, Hickson's Timber Impregnation Co. Ltd., of Castleford, Yorks., has developed the process.

Hitherto the railway has always used

steel sleepers, because of termites and the high incidence of timber decay. Tanalith C preservative is now being used and two processing plants are in action, each capable of permanently preserving 500,000 sleepers a year. It has been announced that no more steel sleepers will be used. Both plants are owned and operated by the railway. One is at Ebute Metta and the other at Port Harcourt.

INDIA

Telegrams on Trains

The facility of receiving personal or business telegrams is to be extended to first class and air-conditioned class passengers in trains running on all important trunk routes. This service is already available in the "Frontier Mail" of the Western Railway.

Transfer of Line Near Delhi

The section between mile 943.62 and mile 949.487, including Tughlakabad and Okhla stations, on the Delhi-Mathura (Muttra) line, was recently taken over by the Northern Railway from the Central Railway. This is part of the former G.I.P.R. main line from Bombay to Delhi via Jhansi, Agra, and Mathura.

Remodelling of Gwalior Yard

The Railway Board has decided to remodel the station yard of Gwalior, on the Jhansi-Agra section of the Central Railway. This has been necessitated to meet the growing needs of current traffic and that anticipated during the second Five-Year Plan period.

Electric Working in Sweden



Swedish State Railways 3,000-h.p. "Ra" class locomotive, weight 61.7 tons and tractive effort 30,000 lb., on main-line train. Note overhead equipment for 15,000-V. electrification

Ondal Yard to be Enlarged

To deal with the increased production of coal in the Raniganj coalfields, it has been decided by the Railway Board to remodel and enlarge the Ondal yard on the Eastern Railway. The remodelled yard will also be able to deal with the increased traffic from and to the Durgapur Steel Plant. Work is being taken in hand immediately.

New Passenger Stations

Two new passenger stations were opened recently, Sulah Punjab on the Pathankot-Jogindar Nagar section and Partapur between Moheen-ud-Dinpur and Meerut City, both on the Northern Railway.

VICTORIA

Success of New Passenger Service

Since the introduction of the Mildura Daylight, a new fast passenger service between Melbourne and Mildura, some months ago, revenue has increased, though not to the extent of the estimated £20,000 a year. The management maintains that it is too early to assess fully the financial success of the new service.

Freight Traffic Records

Records for freight traffic have been achieved during the past year. During February 110,084 tons of superphosphate were carried, 5,000 tons more than planned and a record February loading.

On February 26, 130 wagons were loaded with 2,172 tons of briquettes. The previous record was in November, 1955, when 128 wagons transported 2,160 tons of briquettes.

From July 1 last year to the end of February tonnage of fertiliser amounted to 280,398, 15,592 tons more than for the same period in the previous railway year.

CANADA

New Rolling Stock

New rolling stock acquired by Canadian National Railways during 1957 included 100 passenger vehicles, 6,524 wagons, and 152 service vehicles.

C.P.R. Financial Results

The detailed financial results of the Canadian Pacific Railway Company for 1957 show that earnings were equal to \$3.11 per share of ordinary stock outstanding at the end of the year as compared with \$3.76 per share for 1956. Railway revenue was the second highest in the history of the company, having been exceeded only by that of 1956. Freight traffic volume as compared with 1956 was down 10 per cent, with over half of the decrease having occurred in

grain and grain products moving under low statutory rates. Rate increases added 5 per cent to freight revenue.

Through effective budget control and the benefits resulting from continued modernisation, the ratio of net earnings to railway revenue was held close to that of the previous year, despite the smaller volume of traffic and the incidence of employee welfare costs, higher wage rates, and increased material prices.

Net railway earnings of \$38,200,000 show a decrease of \$3,100,000 on the previous year, and the return on net investment in railway property was only 2·8 per cent.

Other income amounted to \$23,400,000, a decrease of \$6,600,000 on that of 1956. Decreases were particularly marked in dividend income and in net earnings of steamships.

Net income amounted to \$46,800,000, which, after providing for dividends of 4 per cent on preference stock and dividends amounting to \$1·50 per share on ordinary stock, left a balance of \$22,700,000 for modernisation and other corporate purposes.

Capital expenditures amounting to \$135,000,000 were undertaken during the year. Of these, additions to railway plant accounted for \$119,000,000, including \$31,000,000 for the purchase of 154 diesel locomotive units.

"Piggy-back" Services Extended

The Canadian National and Canadian Pacific railways have extended their "piggy-back" services on four additional routes following five months of successful operation between Montreal and Toronto. The four new routes

served by both railways are: Montreal-London, Ontario; Ottawa-London, Ontario; Ottawa-Toronto; and Toronto-Winnipeg.

Since it was introduced on the Montreal-Toronto route last October, "piggy-back" has proved so popular that it was recently extended to serve the Maritime Provinces between Montreal and Saint John, adding another 480 miles to the route system in eastern Canada.

PERU

Re-equipment Programme

A three-year plan to modernise rolling-stock and re-equip lines in the Central and Southern Regions is to be carried out by the Peruvian Corporation Limited. The total cost of the scheme will be some U.S. \$20,000,000.

Among equipment that the company is likely to buy will be locomotives, passenger coaches, freight wagons, and permanent way material, including signalling equipment. The programme is expected to begin in the middle of the year, and requirements will be put out to private tender.

FRANCE

Paris-Lille Express Sets

In anticipation of the completion of the Paris-Lille electrification by the spring of 1959, the S.N.C.F. has placed orders for five-coach sets for express services. The orders are for four first-class five-car sets constructed in stain-

less steel; three sets will be needed to maintain the service, with one in reserve. Each set, made up of one saloon type coach, one saloon-bar coach with telephone cabin, one side-corridor compartment coach, and two saloon-kitchen coaches, provides accommodation for 192 passengers, with reclining seats in other than the kitchen coaches. The telephone cabin will enable passengers to be linked with the Post Office network. The journey of 160 miles will be accomplished by some trains in 130 min., with four trains each way daily. The line from Lille to Roubaix and Tourcoing is not to be electrified at present, so that the express service will be limited to Lille. The local service will continue to operate between Lille, Roubaix and Tourcoing, but it is expected that many passengers to and from the latter two towns will travel from and to Lille Station by road.

Wagon Interchange with Germany

In the early months of 1957, S.N.C.F. wagons, not in the European Wagon Pool, working into Western Germany remained on the German Federal Railway for an average of 5·14 days. German wagons in France remained on the S.N.C.F. for an average of 8·11 days. In view of the R.I.V. wagon hire rates of five gold francs a day for the first 15 days and six gold francs a day thereafter, which came into force on January 1, S.N.C.F. staff are being impressed with the need to ensure that German wagons are promptly returned. The average delay for all foreign administrations' wagons in France is 6·18 days.

Publications Received

Engineers Elite. By Norman McKillop. Hampton Court, Surrey: Ian Allan Limited, Craven House. 9½ in. x 6 in. 154 pp. Illustrated. Price 21s.—Mr. McKillop joined the North British Railway at Haymarket in 1910. "Crossing the gaffer" in those days of autocratic shed foremen nearly brought his railway career to a premature close, but he survived to become one of the top link on the East Coast main line, and a professional writer as well. The largely autobiographical story covers nearly 40 years' experience of engines and men. "To an engineer," he states, "it's all one, so long as he can feel the rise and fall of the trailing axleboxes under his feet, the strain of the drawbar under the load, the feeling of life in response to his hand on the regulator, and the sheer music of big ends, coupling rods, and steel-to-ring-steel contact of driving wheels on the rail."

The Boards of Nationalised Industries. By Lord Simon of Wythenshawe. London: Longmans, Green & Company. 8½ in. x 5½ in. 54 pp. Price 2s. 6d. This booklet has been written by Lord Simon of Wythenshawe in the hope that

it may have some influence on the treatment of members of the boards of nationalised industries. He considers that long-term tenure of top executive posts is essential to successful management. Governments have tended, he complains, to deal with the Chairman and board members of the National Coal Board as they have dealt with the Chairman of the British Broadcasting Corporation so that there has been a failing in continuity. Lord Simon draws on his own experience as Governing Director of two private engineering companies and as Chairman of the B.B.C. in comparing and contrasting the board structure of the N.C.B. and Imperial Chemical Industries Limited. Many of his remarks are applicable to any or all of the nationalised industries.

Safety.—This is the first issue of a magazine published by the Accident Prevention Committee of the British Iron & Steel Federation. It will appear three times a year. It is intended to have a wide circulation in the Industry to managers, foremen, safety officers, trade union officials and members of works safety committees. 20,000 copies of the first issue are being printed to allow for one for every 15 persons employed in the Industry. Copies are also

available for any person outside the Industry who is interested. Application should be made to the Federation, Steel House, Tothill Street, London, S.W.1.

Drop and Upset Forging Technique.—A booklet of 27 pages has been produced to assist the designer to avoid difficulty or extra cost which can be avoided at the design stage. It describes the basic principles of drop and upset forging technique. An explanation of forging terms is followed by some advice on basic drop forging design. Examples from production of both methods are included, besides tables of recommended design dimensions and factors. The booklet is published by Head Wrightson Stampings Limited, Seaton Carew, Co. Durham.

British Waterways Inland Cruising Booklets. Published by British Waterways, 163, Euston Road, London, N.W.1. Price 2s. each.—Nos. 3 and 4 of this well-produced and informative series deal respectively with the Lee and Stort Navigations (Limehouse to Hertford and Bishops Stortford) and with Staffordshire & Worcestershire Canal. Much information, good maps and excellent photographic illustrations are contained within 40-odd pages.

Powder Metallurgy in Railway Engineering

Wider application of small sintered components



General view of a mechanical compacting press shop

INCREASING use is being made in this country of components manufactured from powdered metal in railway engineering applications. Items so made have been used in various industries, including automobile and electrical, but it has only been comparatively recently that they have begun to be used by British Railways. In the first instance, various bushes for wagon brake gear, vacuum brake cylinder piston rod bushes, coach shock absorber components, and so on, have been made by this special process, but it is believed that there are many other cases where the application of such components could be made. Advantages claimed for the process include economy of fabrication; reduced tooling-up time; improved wear resistance; no loss of material as swarf; and the ability for the components to be made of materials not possible by other methods.

Production Economics

Fabrication economies result because it is often possible to mould complicated shapes directly by one pressing operation and, with subsequent sintering, the part is produced to accurate dimensions. If the limits are extremely close, that is of less than 0.001 in. per in., a simple sizing operation can bring the part within the dimensional tolerances required. Such components are of uniform dimensions and considerably reduce assembly times.

Shorter tooling-up time is often possible by commencing production of complicated shapes within a matter of

weeks, whereas the tooling-up by normal machining methods, broaching, shaping, and so on, would take considerably longer. Once the production tool has been established large quantity production is easily maintained to accurate limits. High production rates can be obtained and, dependent on the size of

the part, outputs up to 1,200 pieces per hour from one press can often be achieved.

Improved wear resistance can be obtained both by special materials, and by the advantage of materials that can be oil impregnated. Certain alloys have been specially developed for steam treatment which increase both resistance to wear and scuffing, which apart from being suitable for small shock absorber pistons can also be used for engine spacing pieces and thrust plates.

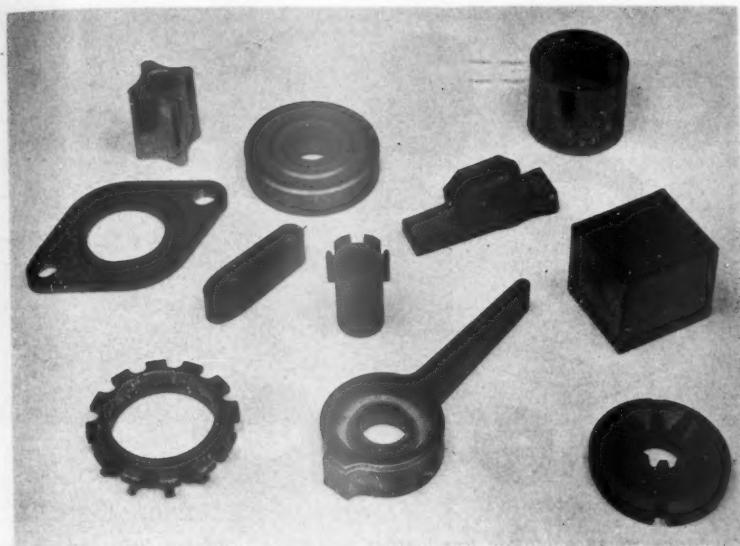
The method of production is such that there is normally no wastage of material from machining operations; it is usual for the part to be moulded outright to its final dimension without further machining. Where required, however, the material can be readily machined by normal workshop methods.

Special Alloys

An example of an alloy which cannot be made by the usual melting methods is silver and nickel. They cannot be mixed by melting due to the separation of the two metals, whereas by the powder method, it is possible to intimately mix the nickel and the silver powder, press and sinter, and by so doing a material having the advantages of both metals is produced. This is used for electrical contacts. Advantage is taken of the inherent porosity of powdered metal products, when, by mixing copper and tin together, a porous bronze can be provided which can be impregnated with oil and used for self-



Sintering furnace, showing wagon brake bushes being loaded on to the conveyor belt



Various sintered components, showing variety of shapes which can be produced by the process

lubricating bearings. Sintered metal friction material can be manufactured also, so that a controlled co-efficient of friction is obtained suitable for clutch and braking materials; and porous metal filters, manufactured from a spherical powder, the use of which enables an accurate control of through porosity, are other developments.

Limitations of Process

Whereas with a normal die casting process, the liquid metal can be made to "run round corners," metal powder flows in a die with extreme reluctance: This factor limits the shape of parts which can be made by the sintered process. Where a change of section occurs in the direction of pressing, for example, precautions have to be taken to ensure that substantially the same ratio between unpressed and pressed volumes is maintained for each section.

Because of the high cost of the compacting tools, it is usually necessary to think of orders in terms of some 20,000 as a minimum for an economic proposition.

The very high compacting pressures required by the process impose a limitation on the transverse area of the parts which can be produced in the normal press. The length of the part is also governed by the amount of travel of the punches.

Normally a maximum transverse area of $2\frac{1}{2}$ sq. in. is specified, of such dimensions as can be enclosed by a 5-in. dia. circle, and a maximum length of $2\frac{1}{2}$ in., but parts are in production with a surface area of over 9 sq. in. In general, the strength of the sintered parts falls below that of parts produced from the solid, a common ultimate tensile strength figure, found adequate for many purposes, being 13/15 ton per sq. in. Some recent developments, however, have produced materials with

ultimate tensile strength in excess of 30 ton per sq. in.

As the cavity of the die must be made to very close limits to prevent the fine metal powder from passing between the cavity wall and the punch, it follows that the compact produced should have much the same accuracy in the dimensions.

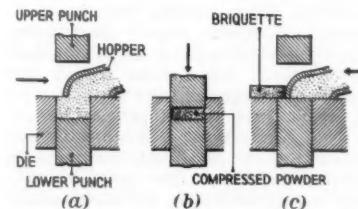


Fig. 1—Stages in the cycle of the compacting operation

sions to which it is constrained by the cavity walls. The length dimension, however, is much more difficult to hold to close limits, since it depends for its accuracy on the setting of the press for correct punch travel and on the accuracy of the press itself. Furthermore, allowances must be made for dimensional changes in sintering, which vary for different materials. Normally a total limit of 0.001 in. per in. can be held transversely and 0.010 in. per in. in the direction of pressing. At the expense of a second operation and a set of coining tools, tolerances may be reduced.

Manufacturing Operations

The general sequence of operations for the production of powdered metal components is as follows: (a) powder blending and mixing; (b) compressing the powder to produce "green" compacts usually termed compacting or briquetting; (c) sintering the compacts;

and, if required, one or more of the following stages: (d) metal impregnating; (e) sizing; (f) coining; and (g) densifying.

The range of metal powders available in suitable form includes iron, copper, tin, brass, and nickel, and various combinations of these and other metals are also employed.

The powders are mixed in the required proportions, in double conical blenders; a small percentage of solid lubricant is normally added to assist compression. The prepared powders are then placed in the hopper of a press and the powder is compressed in dies to the required shape. This compacting process requires pressures of 20 to 40 ton. per sq. in. The "green" powder compacts thus obtained are not strong, but can be handled providing care is taken not to damage the edges.

This is seen in Fig. 1, which illustrates the production of a simple-shaped briquette. The operating cycle comprises: (a) powder fill: with the upper punch withdrawn and the lower punch down, the hopper feeds powder to fill the die cavity, and withdraws sweeping the powder flush with the die face; (b) compression: the upper punch descends to close the die cavity and compresses the powder (in some instances, the lower punch rises to assist compression); (c) ejection: the upper punch withdraws, and the lower punch rises and ejects the component which is pushed aside by the advancing hopper.

Equipment

Fig. 2 shows a typical briquetting die-set for a simple pressed sleeve. Tools are mounted in a mechanical or hydraulic press. Both types are used by Sintered Products Limited, Sutton-in-Ashfield, Notts, which is one of the firms in this country manufacturing components by this process; the works employs a staff of some 160, of which 35 work in the tool room. These

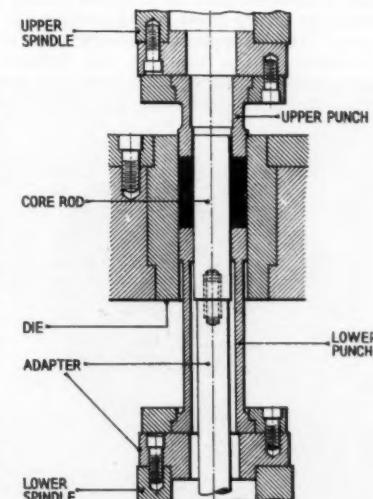


Fig. 2—Typical briquette die-set for simple pressed sleeve

tools include a 40-ton mechanical press developed by Sheepbridge Equipment Limited, of Chesterfield, and a 200-tonne hydraulic machine of German manufacture. Other hydraulic presses used by the company range up to 2,000 tons. After briquetting, the compacts are sintered, a heat treatment normally carried out in a continuous furnace developed from the type used for brazing.

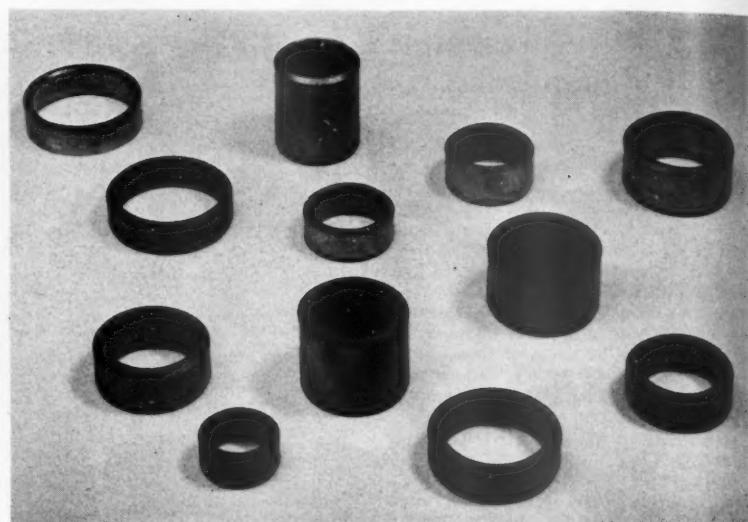
Sintering Process

A controlled atmosphere is essential throughout the cycle to prevent oxidation and, when dealing with iron/carbon alloys, decarburisation. Reducing atmospheres can be used to eliminate any oxide films which may be present on the metallic particles. Any of these conditions can be obtained by judicious mixture of town gas burnt to an endothermic or exothermic state or by dissociation of pure ammonia.

The electrically heated furnaces are equipped with automatic temperature control, which will hold the temperature to within a few degrees of the figure required for the metal being sintered. Normal temperatures are 820° C. for bronze, 875 to 910° C. for brass, and 1,080 to 1,120° C. for iron. Accurate control of sintering time is also necessary. This is achieved by adjusting the speed of the conveyor to suit the mass and composition of the parts passing through. Treatment time varies from about 30 min. for bronze to as much as two hours for iron alloys. A furnace will treat up to 120 lb. of material per hr.

The components produced are clean and bright but suffer some dimensional change during sintering, for which allowance can be made in designing the compacting dies. Where very close limits or exceptional surface finish are required, the sintered parts may be coined or sized. A second set of dies will be required for this operation.

Although it is common practice to use a sintered part as it leaves the furnace or sizing press, subsequent treatment can frequently confer useful properties. For example, the finished part can be impregnated with oil for lubrication, or with wax for inhibiting



Examples of 18-ton alloy iron bushes being produced for British Railways brakework conversion sub-contracts

corrosion. Also, ferrous parts can be steam treated to increase hardness, or may be carburised by the inclusion of graphite in the compact and quenching from the appropriate temperature.

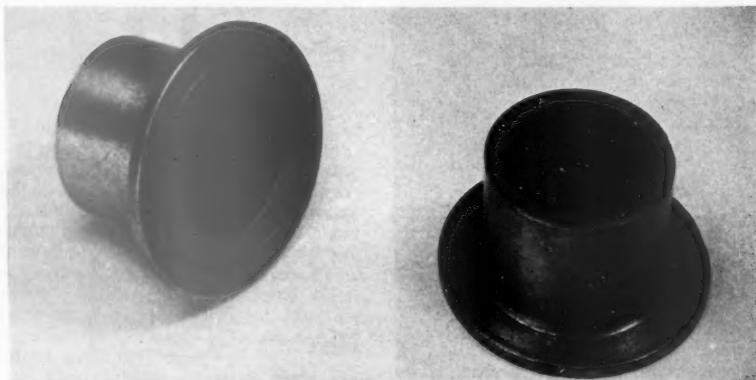
Railway Applications

As has already been indicated, powdered metal products are being applied for railway wagon brake gear bushings. They are also being similarly applied to railway signal components. For brakework uses, a higher strength factor than the normal 13/15 ton material, is required, and a mixture of 90 per cent iron with 10 per cent copper to give a 16/20-ton (18-ton nominal) sintered alloy iron material is used. Besides the lower first cost in using such components, an increased safety factor is claimed, because the porous material retains oil. This reduces the liability to seizure in gear which in many cases is exposed to damp conditions and may not be applied with any frequency. Other brake gear components for which the process appears

suitable include brake gear shaft collars, quadrant changeover gear, washer fulcrum pins, distance pieces, and so on. Racks and pinions for coach door locks, diesel injection fuel pump tappet guides, oil-bronze bushes for platform trucks, are other examples of the wide possible applications of products of this nature.

In the case of vacuum cylinder piston rod bushes, previously mentioned, a standard high density bronze is used; tests have shown increased life for this material in this connection. The brass or gun metal which has previously been used had a recognised life of 10,000 brake applications; in the works, tests involving over 101,000 brake applications have been conducted, after which the bush was still serviceable.

The filtration of lubricating oil and fuel for diesel engines by means of bronze sintered metal filter material is a further example of the use which can be made of powdered material on railways in this country. Compared with the paper filter, which can also filter down to 5 microns, a greater resistance to pressure, temperature, and rough treatment is claimed for the sintered material.



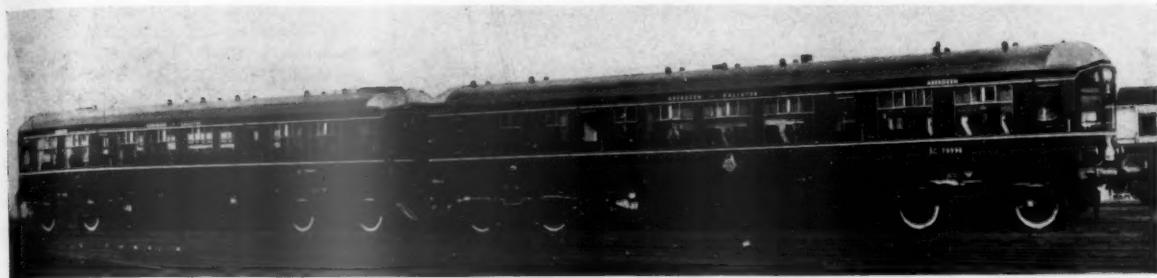
Heavy duty sintered bronze bush for 18-in. vacuum cylinder piston rod bearing

B.I.C.C. DUNDEE BRANCH OFFICE CHANGE OF ADDRESS.—British Insulated Callender's Cables Limited announces that from April 7 the address of its Dundee branch office will be: 2, South Ward Road, Dundee; telephone 5926-7.

INSTITUTION OF LOCOMOTIVE ENGINEERS: FILM EVENING.—An informal meeting will be held by the Institution of Locomotive Engineers on Thursday, May 1, at 5.30 p.m., at the Institution of Mechanical Engineers, 1, Birdcage Walk, London, S.W.1, at which the following films will be shown: "Introducing work study," "Forgemasters in steel," and "High speed flight: Part 1—approaching the speed of sound." The programme will last about 1½ hr. and be in the above order.

Battery Railcar in Scotland

Twin-unit set to enter lengthy trial period over 43-mile branch line in the Scottish Region of British Railways



Twin-car battery railcar now in trial service on the Aberdeen-Ballater line of the Scottish Region

THE recurrent proposals for electric battery railcars in Scotland have resulted in completion of a 70-ton twin-car set which made a demonstration run on March 26 between Ballater and Aberdeen, and is to take up regular revenue service on the Deeside branch when sufficient drivers and maintenance personnel have been given training. This set will replace certain steam trains but will also make additional runs.

The North of Scotland Hydro-Electric Board really initiated the proposals some years ago, and has acted as joint sponsor of this set with the Scottish Area Board of the British Transport Commission and management of the Scottish Region of British Railways. The Hydro-Electric Board contribution is the electric traction and control equipment, and an agreement to supply the charging current at no more than 0.75d. a unit for a period of two years. British Railways provided the mechanical portions, which are those from two in the series of diesel railcars produced at Derby works in 1956, and converted to battery propulsion at Cowlers works this year. The batteries spread over the two vehicles, were supplied by Chloride Batteries Limited, under favourable terms, and the stationary charging plants at Aberdeen and Ballater were similarly supplied by Bruce Peebles Limited.

General Equipment

Consisting of a railcar and a control trailer with intercommunication, the twin set seats 12 first and 105 second class passengers, and also has luggage accommodation. The railcar has two 100-kW., nose suspended traction motors on one bogie, but the batteries, totalling 216 lead-acid cells with a voltage of 440 and a capacity of 1,070 amp. hr., are spread over both vehicles, so that the empty weight of the railcar is 37½ tons and that of the control trailer 32½ tons. Each half-section of the battery weighs about 8 tons, and the two underframes had to be strengthened somewhat to take this weight.

Being impressed with German practice as exemplified by the German

Federal Railway modern bogie battery railcars of types ETA150 and ETA176, the North of Scotland Hydro-Electric Board for its part sought to obtain equipment already proved, and so ordered traction and control equipments as built by Siemens-Schuckert and Schaltbau. Control is effected through series and parallel grouping with three positions of field weakening. As there are none of the voltage surges found in full-electric traction, the motors can be made smaller and lighter than standard types, and the limits of the operating voltages are smaller than a normal electric traction. With lead-acid batteries the operating voltage rarely varies by more than +5 per cent and -10 per cent, and this facilitates the design of the traction equipment. Further, there are none of the interruptions in the motor circuit due to jumping of the collector shoe or pantograph, and so rating conditions for the motors are easier, though it is possible to utilise the motors to a much higher degree than the rated power would normally indicate. Cooling-air for the traction motors on this Scottish railcar is drawn in through grilles on the car sides

and transferred to the motors through flexible ducts.

Heating of the two cars is not electric, but is by means of a Smith-Webasto oil-burning air heater. This is under automatic electrical control, and current for this and for car lighting is supplied by a 2.6-kW., 440-24-V. motor-generator set carried below the railcar floor. An automatic voltage regulator ensures that the generator output is constant.

At each end of the train is a full-width driving compartment, containing a driver's desk, into which is built: (1) a master controller, situated on the driver's left, with two handles, one to select forward or reverse movement and the other to control the speed of the train; the master controller handle contains a device which automatically applies the brakes and cuts off all power to the electric motors in the event of an emergency; (2) a brake valve situated on the driver's right; (3) a raised sloping desk accommodating a voltmeter, ammeter, speedometer, switches and indicating lamps associated with the control equipment; (4) a separate panel having two brake gauges on the driver's

(Continued on page 395)



Interior of second-class saloon, showing seating and lighting arrangements

Mono-rail Transporter Equipment for Civil Engineering Work

Employment by British Railways, Western Region, at Plymouth



Mono-rail strips being loaded with cutting shillet near Plymouth North Road

AS part of the alterations at Plymouth North Road Station, a new wing and retaining wall have been constructed by the Western Region engineers. For this purpose a cutting slope about 20 ft. high had to be excavated, but its toe was close to the down main line, making normal methods of removal of spoil extremely difficult if, indeed, possible. It was therefore decided to use the mono-rail transporter system, enabling the excavation to be carried out without any delays either to the traffic or to the work. The method of procedure was as follows.

A rough and narrow inclined bench was first cut in the cutting-slope for the mono-rail track to be laid, rising gradually from the foot of the slope to a level slightly above the tops of a rake of wagons standing in a dead-end siding beyond an adjacent overbridge at the end of the slope. The mono-rail track was then continued resting on cross-sleepers placed across the tops of the wagons and ending at an auto-stop.

Mono-rail Equipment

The mono-rail equipment consists of : (1) a series of mono-rails linked together with a simple pin connection, each rail having adjustable supports, and automatic stops; (2) a power-wagon, normally with a tipping-skip mounted on it, and possibly one or two trailer skips. Foot-operated mono-rail points are also available for use where necessary.

The power-wagon is equipped with a 3-h.p. B.S.A. air-cooled petrol engine—or sometimes 4½ h.p.—and is controlled with a single lever for forward and reverse movements. The engine has only to be started in the right direction

for the power-wagon and trailers to proceed unattended along the mono-rail track until they are halted by engaging an auto-stop at a suitably pre-arranged spot. The skip has a 13-cwt. (water measure) capacity and will carry 1,400 lb. or 10 cu. ft. of concrete; the trailer skips are similar. The normal speed is 100 yd. a min., say 3½ m.p.h.

The power-wagon with its skip fully loaded will negotiate 1 in 12 gradients, and with two loaded trailer skips added will climb a 1 in 30 incline.

The standard mono-rails are either straight and 12 ft. long or curved to a radius of 12 ft. and 6 ft. long. The

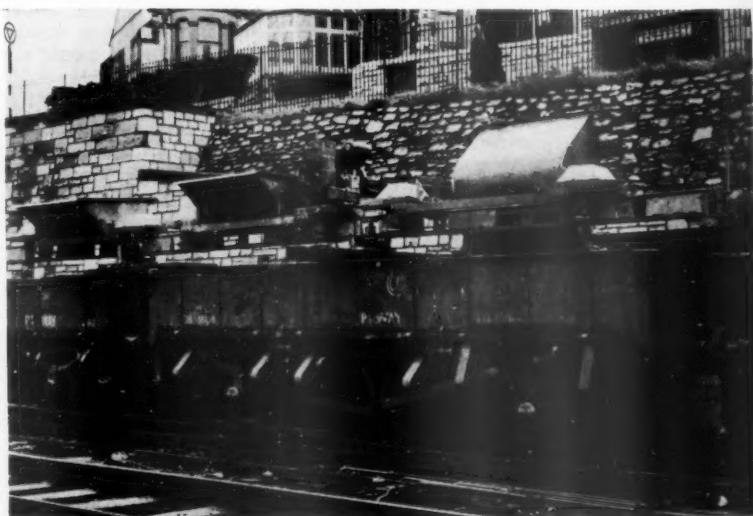
rail-supports or -stands are of two types, low-level and high-level, the former with telescopic legs giving a 9-in. adjustment in height; being independently adjustable they are suitable for side-sloping or other uneven ground. On very soft ground timbers can be used beneath them. The high-level stands follow on in height from the low-level, giving an initial clearance of 2 ft. under the rail, rising to 6 ft. in lifts of 6 in. or 12 in. as required. Temporary wooden trestles may be substituted for high-level stands to give any desired height, and in extreme cases tubular scaffolding may be used with special U-shaped rail-stand feet. On average ground conditions two men can lay 100 yd. of the track in $\frac{1}{2}$ hr.

A straight rail weighing about 1½ cwt. can be carried by two men, who can fix the first few lengths, after which the power-wagon can be mounted on them and carry on the delivery of further rails and stands.

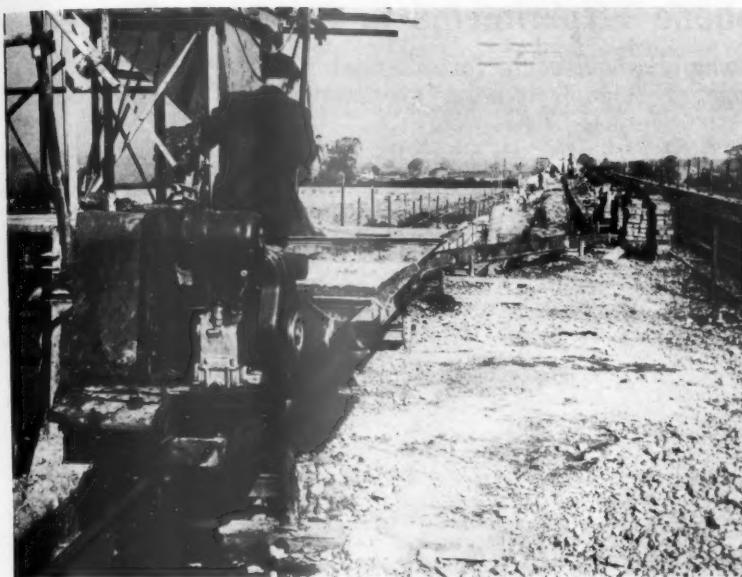
Each length of rail is provided with three holes, in either of which an automatic-stop may be placed as required to stop the power-wagon with or without trailers; a stop can be moved quickly from one hole or one rail to another. In case a stop should be over-run a buffer-stop can be fixed beyond it.

Procedure at North Road

At North Road the power and trailer skips were loaded simultaneously and when they were full the power-wagon was started up and, without attendance, travelled up the inclined bench and on to the standing wagons where an automatic-stop brought it to



Mono-rail laid longitudinally along tops of wagons, and the unloading of three skips (the centre one of a power wagon) of cutting spoil into the wagons



Mono-rail power-wagon skip being loaded from overhead bin; straight and curved sections of rail may be noted

rest. The first two skips were tipped into the farthest wagon and the third into the farthest but one. The round trip of the skips took about 4 min., and meanwhile the men loosened the shillet of which the slope was composed ready for the next loading. One man was employed tipping the skips into the wagons, in levelling the soil in them, and in altering the position of the automatic-stop when necessary.

Actually, it was found that the shillet was so unstable as to require heavy timbering. The wall was built in sections and, after the completion of

the excavation for each section, the mono-rail was extended beyond the beginning of the excavation to a site where a concrete-mixer could stand without fouling the running line; it brought in the concrete from and, later, materials to, the mixer.

Use at Plymouth Friary

Mono-rail equipment was subsequently used in connection with the filling up of a disused cutting near Plymouth Friary. This was because there was no room for a concrete-mixer either beside existing sidings on each

Battery Railcar in Scotland

(Concluded from page 393)

right; and (5) to the left is mounted a 24-V. switch panel for instrument lighting, cab lighting, marker and destination lights, and de-misting fan.

An electrically-driven air compressor with a capacity of 17 cu. ft. per min. is mounted under the control trailer to provide air for the Oerlikon-type air brake, the two-tone horn, and the window wiper. No regenerative braking is installed.

Battery-charging equipments consisting of circuit-breakers, transformers and rectifiers are provided in Aberdeen Joint station against platform 1, and at Ballater station. These are designed to charge the battery at a high rate during the time the train is standing in the platforms during lie-over times at both these stations.

The electrical circuits are so arranged that the charging cables cannot be connected or disconnected from the train while they are alive, thus ensuring the safety of personnel when handling the cables; furthermore, arrangements are

made to prevent the train from being moved while the charging cables are connected. To keep the battery cool during charging, air is blown through the battery compartments by electrically-operated blowers. The battery-charging circuit is also interlocked with the blower arrangements so that charging cannot take place until the fans are switched on and pipes connected.

Electricity supplies, including means for isolating and metering at both charging installations, have been provided by the North of Scotland Hydro-Electric Board, and the characteristics of these supplies are: (1) Aberdeen, 6,600 V., 3-phase, 50 cycles a.c.; (2) Ballater, 11,000 V., 3-phase, 50 cycles a.c.

Trial Route

Choice of the Aberdeen-Ballater line was made so that an adequate test over a period could be made of battery capacity and car capacity. On its length of 43 miles the branch has 12 intermediate stations and the two terminals, so that frequent accelerations from standstill are not imposed on the bat-

teries. On the other hand, there are rating gradients of 1 in 70 and others of 1 in 80 which will require substantial discharge rates if any appreciable speed is to be maintained up them. As yet there is no actual indication as to how far these batteries will go between re-charging when in service on the Deeside line; but in any case it is not proposed to work them to near the limit, as proposed initial schedules give opportunity to re-charge, partially at least, in 50 to 60 min. lie-over times at both terminals. But it may be remarked that the bogie battery cars in Germany, with two 100-kW. motors and batteries of 850-940 amp./hr. on the three-hour rate, are expected to run 100 to 150 miles between re-charging when hauling a control trailer, and on some rosters they cover 300 miles a day with several partial-recharge periods as lie-over times permit. In these cases lie-over times of three to five hours at night permit of full recharge at off-peak current charges. Though having a top designed speed of 60 m.p.h., the set is to be limited to 50 m.p.h. because of track conditions.

Uses of Mono-Rail Elsewhere

As well as being suitable for the jobs quoted above, the mono-rail is proving useful all over the world for various works, for it is especially economical in operation. The power-wagon engine consumes only 2-3 gal. of petrol in an eight-hour day, and as no driver is required, the only other working expenses are for small quantities of oil and grease.

For instance, the system has proved invaluable for carrying concrete considerable distances over spongy ground during the spring thaw in Canada, as it does not churn up the surface nor bog down dumpers, trucks and other transport plant. Incidentally, the laying-down of planks or other runways for barges is obviated.

Moreover, with the special U-shaped rail-stand feet for mounting inclined steel scaffolding, the mono-rail power-wagon has delivered concrete from mixers on the ground for pouring in high walls. Again, in Stockholm, a three-track mono-rail system fed works on the underground railway extension from wet hoppers.

Quantities of concrete up to 350 cu. yd. a day can be carried with trailers and duplication of all units. For tunnelling and other works where a petrol engine is unsuitable, a battery-fed electric motor can be substituted.

V.H.F. Radio Telephone Experiments in the N.E. Region

Maintaining telephone contact with a moving train engaged in snow clearing operations

THE Signal Engineer of the North Eastern Region of British Railways, Mr. A. F. Wigram, in co-operation with Pye Telecommunications, Limited, has been carrying out tests to establish the practicability of using v.h.f. radio telephone communication between Bowes Station and a moving train passing along the line to Kirkby Stephen Station over Stainmore Summit. This particular section of line is susceptible to blockage by snow in winter, and the experiments had in mind the possibility of maintaining telephone contact with snow ploughs working between Bowes and Kirkby Stephen.

At Darlington, a transmitter/receiver with directional aerials, was mounted on the roof of the clock tower at Bank Top Station. The height of the aerial was 90 ft. above sea level and the equipment was operated from a 240-V. 50-cycle a.c. supply. The transmitting frequency on high-band link to Bowes was 162.7 m.c/s.

Link-Through Point

Bowes Station was used as a link-through point between Darlington and the moving train, and here a Pye Telecommunications Limited mobile demonstration van was used. Yagi directional aerials were erected at a height of about 950 ft. above sea level. Transmitting frequency on high band link to Darlington was 172.7 m.c/s and on the low band link to the moving train, 85.875 m.c/s. This equipment was powered by a petrol engine standby set.

At Great Musgrave a talk-through point consisted of a transmitter/receiver and an aerial approximately 500 ft.

above sea level. This was erected in the grounds of the New Inn, Great Musgrave, and was operated from a 240-V. 50-cycle a.c. supply.

A transmitter/receiver was located at Kirkby Stephen Station with an aerial erected on the station roof approximately 750 ft. above sea level. This equipment was also operated from a 240-V. 50-cycle a.c. supply.

A brake composite coach was used to represent a snow plough and this was equipped with a transmitter/receiver and special horizontal polarised aerials mounted transversely across the roof of the coach. An extension control unit was provided in a soundproof cubicle inside the coach. Transmitting frequency on low band link to Bowes was 72.375 m.c/s and the equipment was powered from the coach lighting batteries.

As soon as the coach was clear of Darlington Station, radio contact with Darlington control point via the Bowes Station link-through was established and maintained throughout the journey to Bowes with the exception of a dead spot of a few yards at Winston Station, and a momentary loss in a railway cutting. Loud and clear signals were maintained through Bowes as far as the Summit, but once the coach had passed over the Summit, signal strength dropped fairly rapidly and from Milepost 31, contact with Darlington through Bowes was lost, but good two-way communication with Kirkby Stephen was maintained using Great Musgrave as a talk-through point. On the return journey from Kirkby Stephen contact was re-established with Darlington control point through Bowes at

Milepost 28, and at Milepost 26½ signals were of excellent strength and clarity.

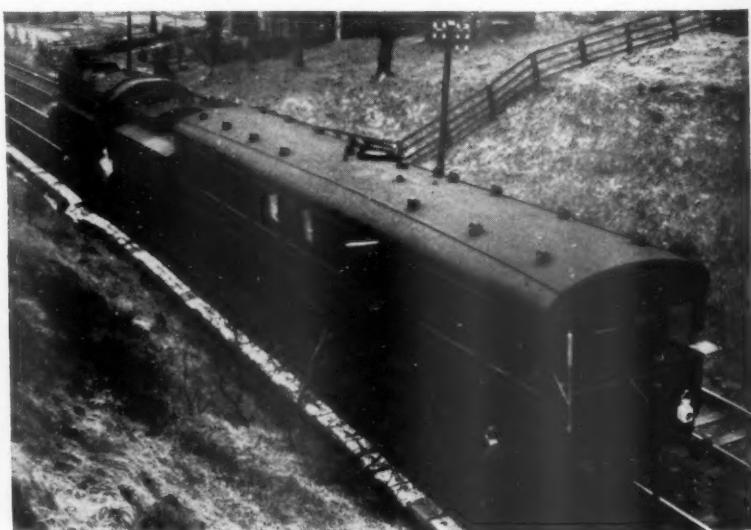
The tests have shown that with installations at Darlington and Bowes, satisfactory communication between Darlington control point and a snow plough operating between Darlington and Stainmore Summit could be maintained, whilst on the section of line between Stainmore Summit and Kirkby Stephen, communication can be maintained with Kirkby Stephen Station using a talk-through point at Great Musgrave.

B.R.S. STAFF INFORMATION WALL-SHEET.—British Road Services have distributed the first issue of an illustrated bi-monthly wall-sheet entitled *B.R.S. News*, for display on staff notice boards at B.R.S. depots and offices throughout Britain; it is designed to keep the staff informed on traffic developments, depot improvements, appointments, and so on.

NATIONAL COMMITTEE ON ROAD TRANSPORT EDUCATION.—The report for 1957 of the National Committee on Road Transport Education states that the increase in the number of either students or examinees expected after the introduction of a revised syllabus in 1955 has been disappointing. One fact, however, stands out on the credit side. The new subject, "Communication and Report Writing," which was incorporated with some misgivings because of its apparently academic flavour, has been a great success. According to the examiners, the general standard of achievement in 1957 was substantially higher than that of the previous year. In 1957, the centres outside London with the most students were Blackburn, Edinburgh, Hull, Leeds, Manchester, Mansfield, Nottingham, and Oldham.



Link-through point at Bowes Station, showing 50-ft. aerial on roof



Brake composite coach, representing a snow plough, at Stainmore Summit, showing dipole aerials at the rear of the coach

RAILWAY NEWS SECTION

PERSONAL

Mr. T. G. Winton, Chief Mechanical Engineer of the Paraguay Central Railway, has retired.

Mr. A. G. Hall, C.I.E., M.B.E., B.Sc., Commissioner of Railways, Western Australia, who, as recorded in our February 14 issue, has resigned on account of ill-health, was formerly Director-General of Rail-

1947, he effected the separation of the N.W.R. within a period of six weeks after which he accepted an offer of the Pakistan Government to become Director-General of Railways, which post he relinquished in 1948. For his work as General Manager of the N.W.R. he was made a C.I.E.

Mr. T. W. Brodie, Chief Traffic Manager, Western Australian Government Railways, who, as recorded in our

Canadian Pacific Railway, has been City Passenger Agent at Regina for the past five years, having returned to that city after service at Montreal 1949-1953. From 1936 to 1943 he was Ticket Clerk at Regina. He joined the C.P.R. in 1925.

The Tilling Group announces that Mr. G. H. Napthine, Director & General Manager of Hants & Dorset Motor Services Limited, will retire on June 30.



Mr. A. G. Hall
Commissioner of Railways, Western
Australia, 1949-58



Mr. T. W. Brodie
Appointed Acting Commissioner,
W.A.G.R.

ways, Pakistan. Mr. Hall was born in Worcestershire in 1894, and was educated at Christ's Hospital and the City & Guilds (Engineering) College, graduating as Bachelor of Science in engineering with first class honours. In 1919 after war service in France, during which he attained the rank of Captain, he became an Assistant Engineer on the North Western Railway, India. Shortly afterwards he was posted to the Khyber Railway Construction, and in recognition of his subsequent service he was awarded the M.B.E. in 1926. After a period of general construction and maintenance work, Mr. Hall undertook part of a survey for a fast main line route between Karachi and Bombay. In 1935 he was appointed Government Inspector of Railways, Burma, and he assisted in the drafting of the necessary Railway Act when Burma was separated from India in 1937. Later, he served as Divisional Superintendent on the N.W.R. and, in 1945, was made General Manager of that railway. On partition in August,

February 14 issue, has been appointed Acting Commissioner, is 63. He joined the service as a junior clerk in 1910, and served in successive grades of the Traffic Branch including those of Clerk, Stationmaster, and Transport Clerk. During the last war he was attached to the Army Movement Control Group in Western Australia, and attained the rank of Major. He subsequently became Deputy Assistant Director of Transportation. Mr. Brodie returned to railway service as Chief Transport Clerk, and, on the formation of the Railway Road Service Section in 1947, was selected for the position of Superintendent of Road Services, a sub-head under the Chief Traffic Manager. In 1951 he became Assistant Chief Traffic Manager (Operating) and, in 1953, Chief Traffic Manager. He is a member of the Institute of Transport.

Mr. C. V. Robinson, who, as recorded in our February 28 issue, has been appointed District Passenger Representative, Regina,

Mr. W. F. Hudson, who, as recorded in our March 28 issue, has been appointed District Mechanical Engineer at Dunedin, New Zealand Government Railways, succeeds Mr. L. M. Johnston. He joined the Railways Department in 1932 as an apprentice fitter-turner at the Hillside Railway Workshops, Dunedin, and in 1938 was transferred to the Locomotive Superintendent's office at Wellington. In 1942 he was transferred to the Locomotive Engineer's office at Auckland, where he subsequently became Assistant Locomotive Engineer and Engineer, Mechanical. Appointed Assistant District Mechanical Engineer, Auckland, in 1948, Mr. Hudson acquired valuable technical and administrative experience in this railway district, which is the busiest in New Zealand. Soon after the advent of diesel-electric traction, he was one of two mechanical engineers selected to undergo a special course of instruction in the United States of America. He is an associate member of the Institution of Mechanical Engineers.



Mr. H. H. Starr
Assistant Commercial Manager, Western Region,
who has retired



Mr. C. A. M. Peaty
Appointed District Commercial Officer,
Lincoln, Eastern Region



Mr. R. W. Jackson
Appointed District Commercial Manager,
Edinburgh, Scottish Region

Mr. H. H. Starr, M.Inst.T., Assistant Commercial Manager, Western Region, British Railways, who, as recorded in our March 7 issue, has retired after 50 years of service with the Great Western Railway and British Railways, joined the G.W.R. in 1908 at Gloucester Goods Station. In 1910 he was transferred to Cheltenham, where he later became Chief Clerk. In 1930, after a period of four years as Townsman (Outdoor Representative) at Gloucester, he was appointed Chief Clerk in the Goods Department at Oxford. In 1933, he moved to Birmingham as Shed Superintendent. He was appointed Chief Clerk to the Goods Superintendent at Birmingham in 1937, and subsequently became Chief Clerk to the District Goods Manager. In 1940, he was transferred to Paddington as Assistant Goods Superintendent, returning to Birmingham the following year as Assistant

District Goods Manager. In 1945, after 12 months as Goods Agent at Cardiff, he was appointed Road Transport Controller responsible to the Chief Goods Manager and Superintendent of the Line. In 1945 he was appointed London District Goods Manager, Western Region, and the following year he became General Assistant to the Commercial Superintendent (Terminals and Cartage). In that capacity, he served for a number of years as a member of the Traffic Co-ordination Committee. Previously he was associated with the former Road/Rail Traffic Joint Committee and the Central Licensing Sub-Committee of the Road/Rail Central Conference. He also represented the Western Region on the Terminals and Road Transport Committees. In 1954, Mr. Starr was appointed Assistant Commercial Superintendent, and later Assistant Commercial Manager, a position he held until his

retirement. During this time he served on the Management side of Sectional Councils, the Traffic Apprentice selection Committee, and the Suggestions Committee. He was closely concerned with the introduction of diesel motive power on the Western Region.

Mr. C. A. M. Peaty, A.M.Inst.T., Assistant District Commercial Manager, Swansea, Western Region, British Railways, who, as recorded in our February 28 issue, has been appointed District Commercial Officer, Lincoln, Eastern Region, was educated at Fettes College, Edinburgh, whence he proceeded with an open scholarship in Classics to Gonville & Caius College, Cambridge. He graduated with First Class Honours and, in 1931, began a course of three years' special training with the Great Western Railway. He subsequently gained experience at Chippenham Goods Station



Mr. H. S. Gordon
Welfare Officer, L.T.E.,
1940-1958



Mr. E. C. Ottaway
Re-designated Chief Supplies & Service Officer,
London Transport Executive



Mr. A. G. Day
Appointed Principal Executive Assistant,
London Transport Executive

and then became Goods Agent at Penzance. In 1941 he was appointed Senior Assistant to the District Goods Manager, Gloucester, and, in 1946, was made Assistant to the District Goods Manager, Worcester, a position which was re-designated Assistant to the District Commercial Superintendent, Worcester, on re-organisation in 1950. In 1955, after having acted for a year as Assistant District Commercial Superintendent, Worcester, he was promoted to be Goods Agent, Swansea, and, early the following year, was appointed Assistant District Commercial Manager, Swansea, the position he now vacates. Mr. Peaty was for a period Secretary of the Gloucester Group of the Institute of Transport, and has initiated a discussion group of the Institute at Worcester.

Mr. R. W. Jackson, who, as recorded in our February 28 issue, has been appointed District Commercial Manager, Edinburgh, joined the former North Eastern Railway in July, 1921. After serving at a number of stations, he entered the office of the District Passenger Manager, Newcastle-on-Tyne, in 1932. In 1937 he was appointed Passenger Canvasser at Leeds and, from 1939 to 1944, served in the headquarters and district offices at York. In 1945 he became Deputy Chief Controller at Darlington, and, two years later, was appointed Assistant to District Operating Superintendent, Burntisland. In 1948 he returned to Darlington as Goods Agent & Yardmaster. In 1952 he was appointed Assistant to District Operating Superintendent, Darlington. A year later he became Chief Freight Trains Clerk, Scottish Region. In February, 1955, he became Freight Trains Assistant to the Chief Operating Superintendent, and, in September, 1956, District Traffic Superintendent, Ayr.

Mr. H. S. Gordon, M.B.E., F.S.A., who, as recorded in our February 28 issue, has retired as Welfare Officer, London Transport Executive, joined the London General Omnibus Company in 1926. After experience in the Traffic Department, he became first House Superintendent of the new head office building at 55, Broadway. In 1933 he took charge of the London Transport canteen organisation, and later, with the title of Welfare Superintendent, was also responsible for sports grounds, institutes, and the other welfare facilities. In 1940 he was appointed Welfare Officer, and in the post-war years was responsible for the full development of the welfare services. His duties included responsibility for hostels, standards of staff accommodation, the personal problem advice section, sick visiting and other welfare measures. Mr. Gordon entered the Royal Military Academy in 1916. He received a regular commission in the Royal Field Artillery, served in France during 1917 and 1918, was wounded and retired from the service. Before joining the L.G.O.C. Mr. Gordon was a Branch Office Manager of the Asiatic Petroleum Co. Ltd. in China. He was made an M.B.E. in 1943 in recognition of his services to Civil Defence. In addition to his normal responsibilities, he undertook the catering arrangements for the thousands of people who sheltered nightly at Underground stations during the bombing raids on London. He is a Fellow of the Society of Antiquaries.

Mr. E. C. Ottaway, R.D.I., M.I.Mech.E., M.Inst.T., Chief Supplies Officer, London Transport Executive, who, as recorded in our February 28 issue, has been re-designated Chief Supplies & Services Officer, becomes responsible for London Transport's Catering Service in addition to his present duties.

He was apprenticed with Clement Talbot Limited and afterwards was engaged on experimental work with the Sunbeam Motor Car Co. Ltd. He subsequently joined the Midland Red Omnibus Company, to which he was later appointed Rolling Stock Engineer. In 1929 he joined the London General Omnibus Company as Assistant Experimental Engineer, and later spent two years with the Associated Equipment Company, with which he was engaged on development work. He rejoined the London General Omnibus Company in 1933 as Technical Officer (Buses & Coaches), retaining that title on the formation of the London Passenger Transport Board. In 1940 he was appointed Acting Works Engineer. In the same year he was seconded to the London Aircraft Production Group, for work in connection with the manufacture of Halifax bombers. He became Joint General Manager of the Group in 1943. This position he held until 1945 when he became Works Manager (Buses & Coaches), L.P.T.B. In 1951 he was appointed Chief Supplies Officer. In 1949 Mr. Ottaway was awarded the distinction of Royal Designer for Industry by the Council of the Royal Society of Arts.

Mr. A. G. Day, A.M.Inst.T., Senior Executive Assistant in the office of the Chief Supplies & Services Officer, London Transport Executive, who, as recorded in our February 28 issue, has been promoted Principal Executive Assistant, is 34. In addition to his present duties in connection with major contracts for plant, equipment and rolling stock, he will be responsible to the Chief Supplies & Services Officer for the general supervision of the ticket machine works (Road Services) and of technical costing of stores manufacture. Mr. Day entered London Transport as a clerk in 1939 and worked in the Accounts and Claims Offices. During the war he was a pilot in the Royal Air Force with the rank of Flight Lieutenant. After his return to the L.T.E. he obtained further experience in the Claims & Legal Adviser's Offices and in the office of the Executive. He joined the Supplies Office in 1954, and, in the following year, was transferred to the office of the Chief Supplies Officer. Later he was appointed Senior Executive Assistant, in which capacity he was responsible for the major contracts section. Mr. Day is an Associate Member of the Institute of Transport.

Mr. T. F. Grisdale, Area Assistant District Engineer, Leeds South, North Eastern Region, British Railways, has been appointed Assistant District Engineer, York.

In connection with the reorganisation of the traffic departments of the London Midland Region, the following officers have been re-designated:

Mr. P. J. Fisher, Divisional Operating Superintendent, Crewe, as Line Traffic Officer (Operating), Crewe; Mr. A. H. Madden, Divisional Motive Power Superintendent, Derby, as Line Traffic Officer (Motive Power), Derby; Mr. A. G. Minty, Divisional Motive Power Superintendent, Manchester, as Line Traffic Officer (Motive Power), Manchester.

In addition to the above, the following re-designations have taken place, although the officers have not yet been appointed:

Divisional Operating Superintendent, Derby, as Line Traffic Officer (Operating), Derby; Divisional Operating Superintendent, Manchester, as Line Traffic Officer (Operating), Manchester; Divisional Motive Power Superintendent, Crewe, as Line Traffic Officer (Motive Power), Crewe.

Mr. S. F. Major, Estate & Rating Surveyor, North Eastern Region, British Railways, retired on March 28, after nearly 47 years' service. He has been succeeded by Mr. C. L. Smith, Assistant Estate & Rating Surveyor, North Eastern Region.

Mr. C. Lofthouse, Engineer, Maintenance, Northern District & New Works, North Eastern Division, Leeds, British Transport Waterways, has been appointed Divisional Engineer of that Division.

Mr. W. Brown, Assistant Regional Accountant, Eastern & North Eastern Regions, British Railways, has been appointed Regional Accountant, Designate, Eastern Region. The appointment follows the decision to establish separate accountancy organisations for each of the two regions.

The London Midland Region of British Railways announces the following appointments:

Mr. J. Cowing to be Chief Assistant to Commercial Officer (Freight), Euston.

Mr. F. S. Clements to be Assistant (Diesel), Motive Power Officer's Office, Euston.

Captain R. A. H. Lord to be District Marine Manager, Holyhead.

Mr. D. A. Stringer, Assistant Dock Manager, Newport, British Transport Docks, has been appointed Docks Manager, Fleetwood. He succeeds Mr. T. Tulloch who becomes Shipping & Port Superintendent at Parkstone Quay, Eastern Region, British Railways.

The Tilling Group announces that Mr. Frank Bryan, Traffic Manager of the Eastern National Omnibus Co. Ltd. since 1932, will retire on May 31. Mr. Bryan began his transport career in municipal service. In 1920, on his return from military service, he joined Maidstone & District Motor Services, Limited on the traffic side of that company, later becoming Assistant Traffic Superintendent. In 1928 he joined the National Omnibus & Transport Co. Ltd. as Assistant Traffic Manager. In 1931 he became District Manager of the Eastern and Midland areas. In 1932 he was appointed Traffic Manager of the Eastern National Company, the position from which he will retire.

Mr. F. S. Middleton, Local Director & Manager, Export Department, Thomas Firth Brown Limited, has retired.

Mr. O. T. Evans has been appointed Chief Engineer, Electrical General Engineering Department, of Metropolitan-Vickers Electrical Co. Ltd.

We regret to record the death on March 16, in his 66th year, of Mr. Colin Kidman Bird, former Manager of the British Thomson-Houston Co. Ltd., Turbine Contracts, Rugby.

THE INSTITUTION OF LOCOMOTIVE ENGINEERS

The following elections have been announced by the Institution of Locomotive Engineers:

President

Mr. R. Arbuthnott.

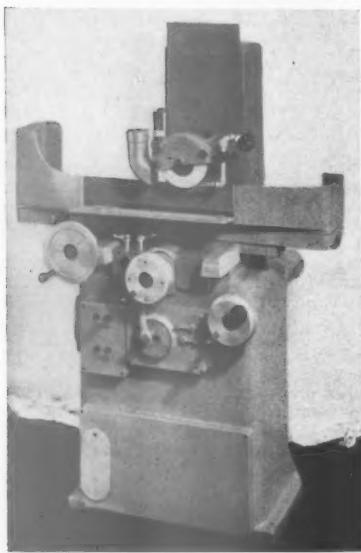
Vice-Presidents

Mr. D. C. Brown and Mr. S. B. Warder.

Ordinary Members of Council

Messrs. H. H. C. Brown, M. G. Burrows, G. Collingwood, A. W. J. Dymond, A. H. Emerson, R. F. Harvey and E. D. Trask.

NEW EQUIPMENT AND PROCESSES



Hydraulic Surface Grinding Machine

HARBOTS Model 618 hydraulic surface grinding machine has been designed to grind precision gauges or for general production with a high surface finish. It is stated to have a minimum number of controls, all at hand level, and to be easy to operate.

The wheelhead is detachable and interchangeable, and designed to run at "just warm" temperature, to avoid the setting up of distortion throughout the machine. It is carried on long vertical precision ground vee slides working in hardened and ground slideways. The spindle is of nitralloy steel suitably heat-treated and

ground all over. It runs in constantly lubricated taper adjustable plain and thrust bearings. A wide pulley is fitted to the rear end, using a wide flat flexible endless belt with tension-adjusting device, and driven by a 1-h.p. balanced motor.

The hydraulic pump is complete with self-contained motor drive and oil tank, and is housed in the base of the machine. All moving parts are continuously lubricated. The working pressure is 130 lb. per sq. in. Table traverse movement can be operated in either direction by hand wheel or by the hydraulic system. Speeds up to 45 ft. per min. can be obtained and smooth reversal of table is maintained even at top speed. The flat and vee table ways are pressure lubricated with filtered oil from the hydraulic system. Infinitely variable control of table speeds and feeds is obtainable. The cross saddle is also equipped with both hydraulic and hand feeds.

Particulars of the Model 618 include: maximum longitudinal table traverse, 19 in.; maximum table cross-traverse, 6½ in.; working surface of table, 18 in. x 6 in.; vertical travel of wheelhead, 11 in.; grinding wheel, 7 in. x ½ in. x 1½ in.; wheel speed, 2,650 r.p.m.; floor space required, 67 in. x 38 in.; net weight, 17 cwt.

For dry grinding the dust collecting unit comprises a direct enclosed motor, suction type fan, dust separator, filter bags, clean air outlet, exhauster, air pipe, adjustable nozzle and air filter. The wet grinding equipment consists of a tank, with electric pump, splash guards, sediment settling tank, necessary piping and adjustable tap electrics to suit. Both wet and dry grinding attachments can be fitted and can be used alternatively.

The manufacturer is Harbots, Devonshire Road, Leicester, from whom further particulars may be obtained.

Bar Chamfering Machine

OF simple design, the Maiden 4-in. bar chamfering machine is intended as a safeguard to the feed fingers and collets of automatic machines as found, for example, in railway workshops. These can be easily damaged unless presented with chamfered bars.

The bar chamfering machine occupies little floor space and is suitable for location either in the bar stores or in the machine shop by the side of the automatics.

It has a four-tool head and requires two sets of tools to cover the range of 1-4 in. dia. One spindle speed is provided, and a 3 h.p. motor is fitted complete with control gear. An outer support is included as standard equipment. Hand clamping is normally fitted as illustrated, although a pneumatic vice is an optional feature.

To produce a chamfer, the rotating spindle is moved forward manually until it contacts the bar which is held rigidly in the self-centring vice. The chamfer is produced quickly when the traverse handle is released and the spindle returns to its original position.

The machine is also suitable for the chamfering of tube ends requiring welding and for the end-forming of tubes or bars.

The 4-in. bar chamfering machine is manufactured by Maiden & Co. Ltd., Hyde, Cheshire, from which company further details may be obtained.

Magnetic Vee Block

THE Eclipse magnetic vee block to facilitate general machining operations on small pieces has been developed. Both contact faces are magnetised by a turn of the switch, securing the work in the appropriate vee slot, and also locating the block firmly to the machine table.

At the same time, as the end of the block is also energised, work can be mounted vertically by turning the vee block on its end, using either or both grooves as required in the upright position. This feature also allows end stops to be held magnetically when the block is used in the horizontal position.

The maximum capacity of the larger vee groove is 2½ in. but this can be opened out by machining if a slightly larger capacity happens to be required. The smaller vee is made to accommodate ½ in. dia. thus allowing better access to work of small diameter.

Although primarily designed for cylindrical work, rectangular and other sections can also be held. The magnet power unit employs the patent Eclipse Alcomax flux-control. This is stated to give optimum magnetic efficiency.

The unit is finished to fine limits, and will be found to be an aid to accurate machine grinding.

Dimensions are 4 in. long, 2½ in. wide and 3½ in. high, and it weighs 8 lb. 14 oz. net. It can be supplied in single units packed in polished wooden case at £11 5s. each, or in matched pairs packed two in a polished wood case at £23 10s. per set. The manufacturer is James Neill & Co. (Sheffield) Ltd., Napier Street, Sheffield, 11.

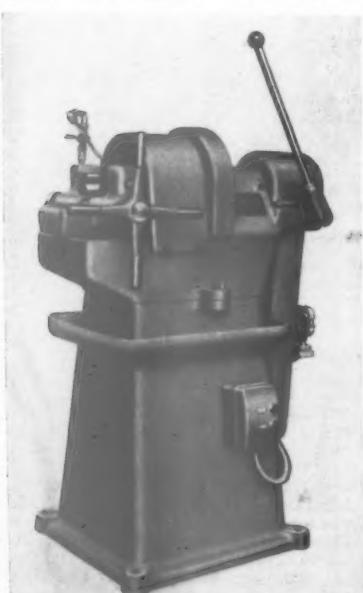
Decorative Wallboard

A WAKERITE-FACED hardboard which is moisture-resistant has been recently introduced for use on all types of vertical surfaces and ceilings. Known as Warerite Wallboard, it consists of a high-density fibre hardboard core surfaced on both sides with melamine resin impregnated papers moulded under heat and pressure. One face incorporates a decorative pattern and the other is a plain compensating surface to protect the core from moisture and to prevent warping.

The wallboard is intended for surfacing inside walls, ceilings, and similar applications in buildings; and tests are being carried out to investigate its suitability for use in railway rolling stock. Its properties make it particularly suitable for application where steamy atmospheres are encountered.

The material has an overall thickness of ½ in., and it can be cut easily to the required shape and size, using ordinary hand or power saws, and finished by filing or sanding. The cut edges can be protected from the effects of moisture by sealing with paint.

The wallboard can be screwed or pinned to timber grounds fixed to the wall, and the joints masked with timber, metal or plastics beading. An alternative method is to



use extruded metal or plastic fixing sections. The product is available in 16 patterns and colours. The standard sheet size is 8 ft. by 4 ft.

The trade price will be 3s. 4d. per sq. ft., with reductions for larger quantities. The manufacturer of Warerite Wallboard is Bakelite, Limited, 12, Grosvenor Gardens, London, S.W.1.

Paint-Bonding Process

THE S.P.C. process has been developed to provide a cold paint-bonding phosphating treatment applicable by spraying, without the need for elaborate equipment. Its use, it is stated, will be equally convenient for large manufacturers of specialised equipment in the transport industry and for makers or repairers of small quantities of work.

The method of use of the process is simple. The surface should first be degreased by wiping with solvent. The surplus solvent is removed by wiping and allowing to stand for a few minutes to permit the final traces to evaporate.

The product is then sprayed on by a standard type of spray gun with acid-resisting operating parts. The solution is allowed to remain in contact with the surface for approximately 5 min. and then removed by washing down. The surface is dried by wiping and finally by force drying. A thin, fine coating of phosphate is produced which affords good paint-bonding, with a reasonable increase in protective value of the finish.

The cost of the treatment is claimed to be low. Bulk quantities at 21s. 6d. per gal., with a coverage of 1,000 sq. ft. per gal., gives a chemical cost of less than 1d. per sq. ft. Operating costs are also low, consisting almost entirely of labour costs.

The S.P.C. process has been developed by the Walterisation Co. Ltd., Purley Way, Croydon, Surrey.

Diesel-Powered Mobile Crane

THE Rapier 4 Fast Standard mobile crane has been designed to meet the road travelling requirements of inter-depot service on railways, and on road haulage and other transport systems. It can work in congested areas inaccessible to a lorry-mounted crane.

The crane has a diesel engine and can be driven at the speed of normal road traffic. It is claimed to be essentially a crane with a normal road travelling performance, and not a road vehicle with crane-mounted unit.

It can turn so sharply that in effect it slews on its road wheels. The turning circle is 11 ft. 4 in. The lifting capacity is 8,000 lb. at 4 ft. outreach, giving a height of lift of 14 ft. or 3,600 lb. at 10 ft. 4 in. outreach, lifting to a height of 6 ft.

Short and long jib extensions are available, giving higher lifts and greater outreaches at reduced loads. The total weight is nearly 7 tons. Props and jacks are stated to be unnecessary.

The chassis is a steel frame carrying the front axle and machinery bedplate, surmounted by an "A" frame structure at the apex of which the jib is pivoted. The engine is a Perkins P.4 diesel, which develops 41 b.h.p. at 2,000 r.p.m. Electric starting equipment and a 10-gal. fuel tank are fitted. Controls include simple reversing switches for the derrick and hoist motions and normal automobile controls for travel.

Separate motors drive grooved winding barrels through worm boxes and spur reductions for hoisting and derrick; each motor is fitted with a self-adjusting magnetic brake which sustains the load or jib when the circuit is broken. Powerful regenerative braking can be effected by switching of the engine with the appropriate control in the "on" position.

Gradients which can be climbed satisfactorily are 1 in 6 and 1 in 10 in unloaded and loaded conditions respectively.

Further details may be obtained from the manufacturer, Ransomes & Rapier Limited, P.O. Box No. 1, Waterside Works, Ipswich.

All-Geared Drilling Machine

A RECENT addition to the range of Grimston Electriska all-geared drilling machines has a 27 in. x 1½ in. capacity, with eight spindle speeds, covering 51-1,300 r.p.m. Alternative speed ranges are available if required. The machine has application to railway workshops whether on a production or maintenance basis.

This machine, which is of the column type, is a development from a previous model which was provided with hand feed only, incorporates four geared power feeds range 0.0055-0.0105 in. for each revolution of the spindle. The all-geared drive head, with all spindles running in ball bearings, is powered by a built-in motor.

The geared power feed mechanism is simple to operate, with means for adjusting the rate of feed whilst the machine is running. A clutch and automatic trip mechanism adjusted to a fully graduated scale is incorporated.

The head, which is arranged with rack and pinion for rise and fall motion, is mounted on a heavy rigid column which also carries an 18 in. x 18 in. square tee slotted table. This table is provided with tee slots on one side face. It turns on the supporting arm which, like the main head, can be raised, lowered and swung on the column. A large machined floor base with tee slots is provided.

The distance from spindle centre to column face is 13½ in., while the spindle



has a 6-in. feed. Other dimensions include 28 in. from spindle nose to table, and 48 in. to base; working surface of nose, 24 in. x 22 in.

Further details of the machine can be obtained from the manufacturer, Grimston Electric Tools Limited, Progress Way, Purley Way, Croydon, Surrey.

Air-Operated Hoist

THE Joy AW-80 single drum hoist is now available with improved controls to provide easier operation.

The AW-80 is a compact machine and weighs 851 lb.; it has a rope pull of 750 lb. and is driven by a four cylinder reversible air motor.

The re-designed brake control handle provides a quicker action. A feature on the air motor throttle and reverse control is the provision of a "dead man's" handle, automatically returning to neutral from any position when released. The hoist is 22 in. long, 9½ in. wide, and 11 in. high. The manufacturer is Joy-Sullivan Limited, Cappielow, Greenock, Scotland.



Self-Adhesive Nameplates

METAL or plastic nameplates, dials and so on, can now be supplied in a self-adhesive form which requires no activating solvent. Railway applications could include, for example, seat numbers and information plates.

The advantage of this type of nameplate is that in many cases a conventional plate may be very difficult to affix by virtue of the position it is required to apply the plate; also there is the cost of drilling, tapping or riveting of such an item which can be more expensive than the nameplate itself. They can be applied on to almost any surface which is clean and free from dust.

Further details may be obtained from the manufacturer, Millett, Levens (Engravers) Limited, Borehamwood, Herts.

The Human Element in the Railway Industry

Abstract of the essay by Mr. F. S. Quant which gained the premier award in the competition arranged by the British Railways (Southern Region) Lecture & Debating Society

A characteristic of the older railwayman is the pride in his job. He will be critical in many respects and especially of conditions in the past, but underlying it all will be that "belongingness," the traditions of the service and the craftsmanship it engendered. There will be that love of one's job, of serving without being servile, craftsmanship at all times however menial the task. These factors do not prevail at present. As the older railwaymen retire an increasing deficit is being posted to the ledger of human relationship.

Causes of Present Staff Situation

One of the causes of the present position was the effects of the last war and its aftermath. The inter-war years were probably the best period of human relationship in the railway industry. Yet they were not easy. The depression of the 1930's was a complication additional to the settling-down processes resulting from the Railways Act of 1921. Added to these was the severe competition from road transport. Yet these troubles brought forth the best in men and management. Cuts in salaries and wages were accepted in a spirit of co-operation. The team spirit shown was magnificent.

Shortage of Trained Staff

The redundancies of the 1930s resulted in short-service staff having to be dismissed and the cessation in the recruitment of juniors. Consequently, the second world war made terrific demands on the railway industry. With an ageing generation of railwaymen they had to rely on their remaining in harness well over their normal retirement age and to make good their staff deficiencies by recruiting labour often only of a nondescript character.

The cessation of hostilities worsened the position. Expanding production generally and high wages not only dried up the sources of recruitment but even drained long-established staff from the railway itself. The housing position prevented railwaymen with families moving from less busy areas. The result was that positions which at one time would only have been filled with reliable and experienced men had to be filled by new recruits and often by those who had little interest in their job and to whom loyalty and tradition of service meant nothing. There were others who were not even interested enough to take promotion.

Aspects of the problem which it would pay to study are: (1) recruitment, (2) training, and (3) co-operation.

Recruitment

Staff should be recruited from the same source whence most were obtained formerly—school leavers, who usually enter the industry enthusiastic and eager to make it a career. Even today the railway still has its appeal, which should be cashed in on. From an immediate economic point of view employment of juniors may be a liability, but the ultimate benefit is the more important factor.

The "B" streams of grammar schools and the "A" streams of secondary modern and technical schools can provide the bulk of requirements. While there should be opportunities for the lowest to rise to the highest, University graduates must come in fairly well up the ladder

even although this may sometimes cause resentment among non-graduates.

Training

Railwaymen of the old school are being lost to the industry by the normal incidence of retirement; before it is too late the best use must be made of such men to inculcate their craftsmanship into those who will have to carry on. To recruit a promising lad and then leave him to the mercies of someone who has no pride in his job is asking for trouble. Some reliable railwaymen should take newcomers in hand even if this means taking them away from their own particular jobs for a period. Even a few weeks in the company of a keen elder railwayman, being shown the right way of doing things, would create a spirit in pupils that would ultimately pay dividends.

Visits to railway installations can be very instructive and create a feeling of "belonging" and pride in one's vocation. Residential school facilities should be enlarged. Good opportunities for further education are available even in smaller towns and younger staff should be encouraged to study subjects even outside their particular calling.

Entrants into clerical grades should have an insight into outside work, for many junior clerks rise to supervisory positions over uniformed men. An alternative is a scheme similar to Army officer selection, whereby promising candidates in the ranks are selected for specialised training. There are at present traffic apprentices, but the scheme envisaged is one where all entrants except graduates start in the wages grades and are then selected on merit.

It would pay to place, say, one or two lads into each permanent way length gang. Not only would they make better candidates for adult positions when they came of age, but they would prove far better material to mould into potential holders of ganger and higher grades. The more suitable lads could be given theoretical instruction during part of their junior service.

The young entrant must not be killed with kindness or bored with monotony; he should be encouraged to move about, for this will help him to decide upon his ultimate aim in his railway career.

Co-operation

There must be real co-operation between all grades, and team spirit.

Even amongst many of the keenest and most loyal railwaymen, however, there is a feeling of frustration, of drifting with the tide. There are several reasons for this. The present promotional schemes are not wholly ideal; staff are divorced from parent Regions because of boundary adjustments—though this is in the process of being resolved; there are differences in conditions and privileges as between salaried and wages grades.

Again, when the industry is striving hard to achieve prosperity, resources are being sapped in many directions. Lights kept burning in unoccupied offices, on station platforms, in shunting yards and so on, long after daybreak; refuse bins overflowing with half-burnt coal, stationery and other costly material scrapped or destroyed for no apparent reason

whatever, staff employed on Sundays doing jobs that could very well be done during normal working hours—these are a few examples that tend to sour the most conscientious men.

Many existing prejudices must be scrapped, though it may be hard to forget past grievances. Management and men must sit round the table in a spirit of contribution. There should be consultation at all levels with full and frank information available to all ranks and the personal touch at all times. The officer who moves about amongst the staff even though he loses his temper at times is held in far greater respect than the one who is known only by his signature.

The Secretary of the Southern Region Lecture & Debating Society in a circular once said this in effect: "The more we mix up the various grades in our membership the more we shall respect each other and profit by the experience."

This should not be the dream of a visionary, but the aim of the realist. Sow the seed of "belonging," of self-discipline, of putting in rather than getting out, feed it and tend it and the resulting crop will not disappoint.

Civic Reception to Railway Queen at Peterborough

Britain's Railway Queen, Miss Teresa Boyden, was given a civic reception recently in her home town of Peterborough in the presence of Sir John Benstead, Deputy Chairman of the British Transport Commission, and representatives of the N.U.R., A.S.L.E.F., and T.S.S.A. She was received at the Town Hall by the Mayor, Councillor G. A. Smith, and the Mayoress, Miss L. Callaghan.

In his address of welcome the Mayor spoke of the pride felt that this year's Railway Queen had been chosen from Peterborough and of their admiration for the work done by the Railway Queen in the interest of fostering goodwill.

Sir John Benstead recalled his years of association with the activities of the Railway Queen and of the tradition and history of the organisation behind those activities, and expressed his appreciation to all the railwaymen who had for the last 30 years given voluntary service to the ideals of fostering goodwill through the movement. There were 570,000 men and women in the railway industry and wherever the Railway Queen went, she was the symbol of each of those homes because she herself was the child of a railwayman.

The Mayoress also welcomed Miss Boyden and on behalf of the officers of British Railways, and of railway trade unionists of Peterborough presented her with a travelling clock.

Miss Boyden thanked all associated with the Civic Reception and the Mayoress for the gift made by the railway fraternity of Peterborough. She recalled that Peterborough had figured prominently in railway history for over 100 years; and she was convinced that with the modernisation now taking place, Peterborough and its railwaymen would play an equally prominent part in the future.

Editorial reference to the Railway Queen movement was made in our February 21 issue.

European Passenger Service Improvements, 1958

Accelerations in summer timetables effective from June 1

In our issue of November 1, 1957, details were given of the alterations to some principal Continental train services planned by the 1957 European Timetable & Through Carriage Conference to take effect from June 1 next. Further particulars show that, mainly as the result of additional electrification in Germany, France, and Austria, considerable accelerations are planned. In other cases, with smaller accelerations, new connections will be made between trains already existing, which will substantially reduce overall journey times.

France-Germany

The "Mozart" express, at 1.23 p.m. from Strasbourg (connecting with the 8 a.m. first class only *rapide* from Paris Est) will carry second as well as first class passengers, and reach Munich at 6.39 p.m., 35 min. earlier, and give a new connection for Salzburg. The 3.46 p.m. from Strasbourg (8.25 a.m. from Paris Est in summer and 8.10 a.m. in winter) will reach Munich at 10.14 p.m., 74 min. earlier, and Vienna at 6.20 a.m., 1½ hr. earlier. The diversion of the T.E.E. diesel-electric "Saphir" beyond Cologne to Frankfort instead of Dortmund will give a direct service also from Ostend and Brussels to Bonn and Mainz, and will not affect the times to Dortmund and other Ruhr stations, as passengers from these will continue from Cologne by the "Rhein-Blitz," to which the "Saphir" at present runs attached between these points; the same applies in the opposite direction.

Holland-Germany

On the Cologne-Mannheim-Basle route electrification from Karlsruhe southwards will benefit in particular the services to and from Holland and Hamburg. The summer 6 p.m. from the Hook of Holland to Basle, which will start at 7.19 p.m., will still arrive at Basle S.B.B. at 6.40 a.m., an acceleration of 79 min. The "Riviera Express," booked through Switzerland without a public stop between Basle and Bellinzona, will start from Amsterdam at 2.45 p.m., instead of from Cologne, and will leave the latter 36 min. later at 6.52 p.m., but will be 5 min. later only into Basle. The present 10.48 a.m. from Amsterdam to Cologne, Nuremberg, and Vienna will start at 12.45 p.m., and pick up the whole of the 2-hr. difference in running, arriving in Vienna at 7.35 a.m.

Germany-Switzerland

The "Loreley Express" and the "Jugoslavia Express" are to be separated, as the result of which the former will reach Basle 55 min. earlier, at 6.26 p.m. In the reverse direction there will be a more radical change, as the start from Basle will be at 12.13 p.m. instead of 10.30 a.m., and the arrival at the Hook of Holland at 11.12 instead of 10.34 p.m., a 65 min. speed-up; considerably later connections from Lucerne, Interlaken, and Berne will be made in this way. It does not appear at present, however, that the "Rheingold" acceleration, bringing that train into Basle S.B.B. 32 min. earlier, at 4.34 p.m., and with the northbound journey started 32 min. later, at 1.24 p.m., will effect any improved Swiss connections.

Patronage of the "Komet" (Hamburg-Zurich), hitherto a diesel-operated sleeping car train of special articulated design, has resulted in it being changed to a loco-

motive-hauled train with first and second class sleeping cars and second class *couchettes*; it will run daily instead of tri-weekly and will be slowed by 15 min. southbound and 26 min. northbound, in which direction it will leave Zurich at 8.30 instead of 8.1 p.m., and reach Hamburg-Altona at 10.5 instead of 9.10 a.m.

France-Switzerland

Improvement of connections at Geneva will greatly accelerate the service between Lyons, Berne, Zurich and Munich. Thus the 10.15 a.m. from Lyons will be brought into Geneva by 12.35 p.m. to connect with the "Rhône-Isar" at 12.45 p.m. giving the fast time of 5 hr. 38 min. from Lyons to Zurich, and of 11 hr. 52 min. from Lyons to Munich, to which the "Rhône-Isar" runs through.

Over the Simplon line the new day fast Paris-Milan service, inaugurated in the summer of 1956, is to be accelerated; by reason of the Dijon-Vallorbe electrification the 8.10 a.m. from Paris will reach Milan at 6.10 p.m., 80 min. earlier. Here connection will be made with the 6.20 p.m. to Venice, where the arrival at 9.28 p.m., in just over 11½ hr. from Paris, will be 2 hr. earlier than now.

Germany-Austria-Italy

A new Austro-Swiss railcar service, called the "Transalpin," is to leave Vienna daily at 11.40 a.m., and running by Salzburg, Innsbruck, and the Arlberg route will reach Zurich by 11.20 p.m.; the corresponding reverse working will be from Zurich at 10.50 a.m., reaching Vienna by 10.25 p.m. Another Austrian railcar service, the "Venezia," working between Vienna and Venice via Villach and Udine, is to be speeded up by 43 min. southbound and 30 min. northbound, leaving Vienna southbound at 7.40 a.m. and reaching Venice at 6.10 p.m., and in the latter leaving Venice at 7.48 p.m. and reaching Vienna at 6 p.m. A new train called the "Italicus" is to run from Munich at 6.34 p.m. to Innsbruck and Italy via the Brenner, reaching Bologna at 3.57 a.m., Florence at 5.37 a.m. and Rome at 9.47 a.m. This will be faster than any existing Munich-Rome service. The summer "Tyrol Express" from Ostend to Munich is to be extended to Bologna.

Germany-Scandinavia

A new service is to run from Stockholm at 7.15 a.m. and from Copenhagen at 4 p.m. to Hamburg via the Gedser-Grossenbrode ferry, reaching Hamburg at 10.37 p.m., and thus affording facilities similar to those given for day travel northbound. The fast "Skandiapilen" service is to leave Oslo 2 hr. earlier, at 11.35 a.m., and Gothenburg at 5.10 instead of 6.55 p.m., to reach Copenhagen by 10.10 p.m. and so to connect with the 10.30 p.m. (previously 10 p.m.) to Hamburg via Gedser-Grossenbrode, with an arrival in Hamburg-Altona at 6.52 instead of the present 6.31 a.m. The northbound "Scandinavia-Italy Express" is to be accelerated 75 min.

Eastern Europe

Extensive changes are to take place in the international services between countries behind the Iron Curtain, and also the through services with their neighbours. A new train, the "Vindobona," will leave

Berlin Ostbahnhof for Vienna via Prague at 7.7 a.m., taking 12 hr. 6 min., and will return at 9.25 a.m., reaching Berlin at 9.49 p.m., considerably quicker than any existing service.

A new "Pannonia Express," also to relieve the "Balt-Orient Express," will run from Berlin at 9.36 a.m. to Sofia via Prague, attaching at Breclav a through portion from Warsaw, and detaching at Budapest a through portion for Bucharest.

A through summer service is to be run between Berlin and Odessa, via Warsaw, Brest-Litowsk, and Kiev; it will involve two nights in the train. For the first time since the last war, a through service is to be resumed between Berlin and Basle, leaving Berlin Ostbahnhof at 7.45 p.m., and reaching Basle at 12.59 p.m.; the return will be at 5.49 p.m., with an arrival in Berlin at 10.9 a.m.

Locomotive Engineers Visit Westinghouse

Members of the Institution of Locomotive Engineers visited the Chippenham Works of the Westinghouse Brake & Signal Co. Ltd., on March 28. The main party travelled from London by train, and was entertained to luncheon on the train by the directors of the company; and members who travelled independently of the London party were invited to luncheon at the company's sports ground pavilion at Chippenham.

The works had its origin in 1895, when a small factory for the manufacture of railway signal apparatus was established by Evans O'Donnell & Co. Ltd. Now the principal works of the Westinghouse Group, it covers some 30 acres and employs more than 5,000.

One department of interest which was visited was the mechanised iron foundry, which can handle castings up to one cwt.; the total weekly output of all castings from the works is some 80 tons. The foundry is also equipped with rock-ing-arc electric furnaces for the production of spherical-graphite cast iron.

Other departments inspected included the moulding, machine, welding, electro-plating and sheet metal shops. In the last mentioned, signal control panels and rectifier casings are among the normal production items. An example of an electronic control panel for a British Railways marshalling yard which is being modernised was seen under construction.

Production of vacuum brake piston rods was seen in the machine shop and elsewhere. These are being manufactured to meet the requirements of the whole Group, which is understood to be 100,000 units. Production of the rods is some 2,000 per week. Another shop is being laid out for the mass production of vacuum brake cylinders. When in full production, a weekly rate of over 400 cylinders is planned.

The party was also shown signal equipment under production and test, including mechanical type signal frames, power-operated point machines, colour light signals, and switch boxes for the company's standard design of C.T.C.

Deminations

Special demonstrations were arranged to show the latest type of rectifier applicable to railway traction, the electro-pneumatic brake valve equipment, and remote control methods of signalling.

Air brake equipment, of the "L"

series, was shown on a specially designed rig, to simulate the operation of the brake in service. This design is intended for the Southern Region Kent Coast electrification multiple-unit, main-line, 25-kV. electric, and the London—Manchester Pullman diesel trains. The E.P. control unit is smaller and lighter than previous designs of this equipment. A feature is that the choke size can be varied on each unit to suit the particular size of brake cylinders of the vehicle to which the unit is fitted.

The demonstration of the electronic remote control signalling methods was of the Westronic transistorised system which is under development by the company. Models representing a typical control box and the section of track controlled therefrom, are arranged in two separate boxes. Connection in practice is by two telephone wires, either overhead or in underground cabling. The occupation of a track by a train can be simulated, and the operation of points and signals, and relative indicating devices, can be demonstrated.

Floating Containers on British Waterways

Reference was made on page 351 in our issue of March 21 to demonstrations which British Waterways are holding of a number of prototype floating containers. These have been evolved to provide the speedy movement of freight traffic over 100 miles of narrow waterways in the Midlands. The accompanying illustrations show the containers being towed by a tug in the form of a "water train" (left); and the versatility of the design which enables them to be lifted from the water by crane directly on to a road vehicle (right).

In the Midlands there is a considerable volume of short-haul traffic passing in small quantities between canal-connected premises, and for traffic of this kind the floating container system is thought to have real advantages. The need for a high standard of packing is eliminated, there is a high degree of immunity from loss or damage, and the costs of loading, stowing and unloading are minimised.



A "train" of five containers on a Midlands waterway

The lightness would give a low weight to payload ratio and would facilitate handling. Watertight doors, designed to open outwards, would give easy access for loading or discharge. The production of containers, it is stated, will depend on the demand.

Towing attachments which slide in slotted tubes to the full depth of the containers allow for "trains" of containers being loaded at varying depths, and also prevent rolling and turning.

Civil Aviation on March 19 whether, in view of the potential danger from the discharge of untreated sewage in public places, and the solution of this problem achieved as regards air travel, he would set up a special committee to inquire into improvements in lavatory services in long-distance trains.

Mr. G. R. H. Nugent: No. This is a matter for the B.T.C., which recently had the whole question of track pollution investigated by a committee. The Commission is now considering certain modifications in existing methods which the committee recommended.

Parliamentary Notes

Post Office Facilities at Stations

Mr. Hector Hughes (Aberdeen N.—Lab.) intimated in the course of a question to the Postmaster General on March 19 that the postal and telegraph facilities in Kings Cross and Euston stations were inadequate.

Mr. K. Thompson, Assistant Postmaster General, said that reconstruction of Euston station included a branch P.O., with provision of a new temporary office meanwhile. At Kings Cross a few extra facilities had recently been provided, but no more could be done until the station was rebuilt.

Questions in Parliament

District Railway to Basildon

Mr. Somerville Hastings (Barking—Lab.) asked the Minister of Transport & Civil Aviation on March 17 what plans for the extension of the District Railway to Basildon had been submitted to him; and how soon the work on this project would be commenced.

Mr. Harold Watkinson, in a written reply: None; but if the traffic potential justifies a rail service, consideration will be given to the possibility of serving Basildon by the L.T.S. Line, which is to be electrified.

Track Pollution

Mr. Somerville Hastings (Barking—Lab.) asked the Minister of Transport &

Staff and Labour Matters

London Busmen's Wage Claim

The T.G.W.U. Finance & General Purposes Committee was due to meet yesterday (Thursday), to consider the decision of the delegate conference of the union that industrial action should be taken in connection with the claim for a 2s. increase for London Transport bus workers.

The Industrial Court recommended an increase of 8s. 6d. a week to Central London bus crews only; it was expected that the Finance & General Purposes Committee would give the General Secretary power to call a strike in support of the demands, which had been modified to the extent of seeking an increase of at least 10s. 6d. a week for all L.T.E. bus workers.

It was understood that before any action was taken, Mr. Frank Cousins, General Secretary of the union, would seek a meeting with Sir John Elliot, Chairman of the London Transport Executive.

The L.T.E., on March 27, rejected a proposal from the union that it should withdraw its plans to cut bus services until the wages issue had been settled. Crews of Central London buses have threatened to ban overtime after the cuts have been introduced. The cuts are proposed because of the fall in traffic and amount to less than a 4 per cent reduction in services and to only about 2 per cent in the peak hours.



A container being lifted from water on to a road vehicle

Contracts and Tenders

English Electric Deltic diesel locomotives for British Railways

The British Transport Commission has announced that an order is being placed with the English Electric Co. Ltd., for 22 main-line 3,300-h.p. "Deltic" type diesel-electric locomotives for use on express passenger services between London Kings Cross, Leeds, Newcastle, and Edinburgh. The order follows the use of a "Deltic" locomotive on trials in regular service on British Railways since November, 1955. Deliveries will begin in 1960, for completion by mid 1961. Eight will be allocated to Kings Cross, Eastern Region, six to Newcastle, North Eastern Region, and eight to Edinburgh Scottish Region.

Metropolitan Cammell Carriage & Wagon Co. Ltd., has received an order for 1,365 four-wheel covered wagons (type "CR") for the Pakistan Government Railways. The order is valued at some £1,500,000.

Cantieri Riuniti Deli Adriatico, has received an order for 227 bogie rail wagons, type B.R., from the Pakistan Government Railways.

The North British Locomotive Co. Ltd., has placed an order with the General Gear Division, Park Works, of David Brown Industries Limited, for 56 axle-mounted gearboxes. This follows the placing of an order by British Railways for 52 main-line diesel-hydraulic locomotives. Each gearbox consists of two primary and two secondary units. Each of the primary units has two-stage reduction, first through single helical gears and second through spiral bevel gearing, while the secondary units effects a single reduction through spiral bevels. Production of the gearboxes will be at the rate of three sets a month to keep pace with the scheduled monthly delivery of three locomotives. The order is valued at £250,000.

The General Electric Co. Ltd., has received an order from the London Transport Executive for seven equipments incorporating camshaft controllers of the pneumatic pawl escapement type for installation in surface line rolling stock. A prototype has been in service on the Piccadilly Line of London Transport for 12 months. This type of controller is electro-pneumatic in operation, incorporating an escapement which provides smooth progression without the use of a damping fluid. In addition to the resistance and weak-field, motor combination and reverser cam groups, the unit contains the line switches and the accelerating and protective relays.

British Railways, North Eastern Region, have placed the following contracts:—

J. Scott & Co. (Electrical Engineers) Ltd., Newcastle: electrical installation, Hull Dairycotes Motive Power Depot
E. Dixon Barker & Sons Ltd., West Hartlepool: installation of pipes and outside hoppers, Thornaby Motive Power Depot

E. Davis (Fixers) Limited, York: supply of steelwork, bridge No. 34, Sussex Street, Middlesbrough

Cawood Wharton & Co. Ltd., Harrogate: staff accommodation block, Dinsdale Rail Welding Depot

Cawood Wharton & Co. Ltd., Harrogate: design and erection of structural frame, Holgate Villa site, York.

The Special Register Information Service, Export Services Branch, Board of Trade, has received calls for tenders as follows:—

From Portuguese East Africa:

120 drop-sided 40-tonne open wagons. The issuing authority is the Ports, Railways & Transport Department, Lourenco Marques. The tender No. is 78/58. A provisional deposit of Esc. 70,000 must be made by tenderers. The closing date is July 4, 1958. Local representation is essential. The Board of Trade reference is ESB/7726/58.

An unspecified quantity of smoke flues and tubes, and steel shafts.

The issuing authority is the Ports, Railways & Transport Department, Lourenco Marques. The tender No. is A/CFB/1/1-46/58. A provisional deposit of Esc. 20,000 must be made by tenderers. The closing date is June 25, 1958. Local representation is essential. The Board of Trade reference is ESB/7727/58.

From South Africa:

6 electric motor driven portable lifting jacks, each of not less than 20-ton capacity, complete with three master controllers. The jacks are required to operate in pairs, simultaneously, in conjunction with a lifting beam and controlled by a common controller, and are to be so arranged that they may be easily manoeuvred into position.

The issuing authority is the Stores Department, South African Railways. Bids, in sealed envelopes, endorsed "Tender No. F.7216: Coach Lifting Jacks," should be addressed to The Chairman of the Tender Board, P.O. Box 7784, Johannesburg. The closing date is April 25, 1958. The Board of Trade reference is ESB/7817/58.

From Pakistan:

20 Neale's combined tablet and block instruments, Westinghouse Brake & Signal Co. Ltd., cat. part 12, Sec. IA standard type or similar with additional features.

The issuing authority is the Department of Supply & Development, Government of Pakistan. The tender No. is DS-1/4757/ENG/57. Bids should be sent to the Director-General of Supply & Development, Chittagong. The closing date is April 24, 1958. Local representation is essential. The Board of Trade reference is ESB/7714/58.

3,600 cold drawn sleeves, seamless, stainless steel, for piston rods, fitted to vacuum brake cylinders, drg. No. VB-42/8. To P.R.S. spec No. R-3-49, steel class II.

The issuing authority is the Department of Supply & Development, Government of Pakistan. The tender No. is CT-2/51462/2/57. Bids should be sent to the Director General of Supply & Development, Frere Road, Karachi. The closing date is April 15, 1958. Local representation is essential. The Board of Trade reference is ESB/8231/58.

250 stretcher bars, split sets of metre gauge, as per SE/CRB's drg. No. SE/SK/617 & PRSS No. M3-49.

The issuing authority is the Department of Supply & Development, Government of Pakistan. The tender No. is CT-2/49581/2/57. Bids should be sent to the Director General of Supply & Development, Frere road, Karachi. The closing date is April 16, 1958. Local representation is essential. The Board of Trade reference is ESB/8232/58.

Further details regarding the above tenders, together with photo-copies of tender documents, can be obtained from the Branch (Lacock House, Theobalds Road, W.C.1).

The India Supply Mission, Washington, invites tenders for the supply of 4,000 fish plates for 90-lb. rails and 13,000 mild steel plates. See Official Notices on page 408.

The Director General India Store Department, Government Building, Bromyard Avenue, Acton, London, W.3, invites tenders for the supply of 165 superheater elements. See Official Notices on page 408.

FIRTH CLEVELAND INSTRUMENTS LIMITED NEW FACTORY.—Plans for a new factory at Treforest, Glamorganshire, to house Firth Cleveland Instruments Limited, formed last May as a subsidiary of Simmonds Aerocessories Limited, are now completed. The building will be approximately 350 ft. long and 240 ft. wide; it will cover an area of approximately 80,000 sq. ft. with first floor office accommodation on two sides. It will be joined to the main Simmonds factory by an overhead canopy to facilitate the transfer of goods and components in inclement weather; and the frontage will be designed to blend with the Simmonds factory at its rear. When completed, the factory, which is now marketing the instruments produced by Simmonds Aerocessories Limited, will also take over production.

KIRKBY-IN-ASHFIELD LOCOMOTIVE DEPOT TO BE MODERNISED.—Work which has started on the construction of a new mechanical coaling plant at the London Midland Region Kirkby-in-Ashfield locomotive depot marks the first stage in a general modernisation scheme for the depot. Besides the coaling plant, a mechanical ash lifting plant is to be provided and the engine shed is to be extended to accommodate 32 locomotives instead of 12 as at present. The track layout at the depot sidings is to be remodelled to make for easier working and to improve tight curves which were intended for smaller locomotives than the size now allocated to the depot. Other improvements are the installation of electric light in the shed and yard, the provision of additional inspection pits and better signalling. The extension to the shed will afford improved working conditions for the examination and repair of the locomotives based on the depot. Of the 63 allocated, 38 are of the Class "9" freight tender type. The locomotives at Kirkby-in-Ashfield are used almost exclusively on working heavy coal trains and the depot is likely to continue to operate with steam locomotives for many years.

Notes and News

Motive Power Policy for Rhodesia.—The General Manager of the Rhodesia Railways is Mr. J. W. S. Pegrum, and not Lt.-Colonel H. B. Everard, as was stated in error on page 356 of last week's issue.

Twin-Car Diesel Sets for British Railways.—In our description of the British Railways twin-car diesel sets being built by Park Royal Coachwork Limited in the March 28 issue, reference was made in the list of sub-contractors to Samuel Willford Limited. The correct title of the company concerned is Willford & Co. Ltd.

Aberdeen Enquiry Office.—A new enquiry and reservations office at Aberdeen Joint Station was opened informally on March 26 by Sir Ian Bolton, Chairman of the Scottish Area Board. The office has been provided to deal more effectively with the growing business in seat and sleeper reservations, and in general travel enquiries. Last year about 23,000 sleeper reservations and 70,000 seat reservations were made at Aberdeen.

Battery Railcar Test Run.—With Mr. James Ness, Regional General Manager, and Mr. Thomas Johnson, of the North of Scotland Hydro-Electric Board, Sir Ian Bolton, Chairman of the Scottish Area Board, B.T.C., was present at a special demonstration run of a new 70-ton 200-kW. twin-unit storage battery railcar-train from Ballater to Aberdeen on March 26. Regular working is to be taken up a few weeks hence. A description of this train is given on page 393.

Brickwork Cleaning at Watford Junction Station, L.M. Region.—Built of Suffolk Cellular bricks in 1873, the station buildings at Watford Junction, London Midland Region, have been brought back to their original straw colour. The cleaning of the brickwork was undertaken by the Regal Stone Cleaning & Restoration Company, London, N.19, using continuous misty water spray and brushes and mason's Hollington grit stone, where necessary. The work was completed in a month by six men. The accompanying

illustration shows the appearance of the brickwork before and after (on left) cleaning.

Wolf Electric Tools (Holdings) Limited.—Group profits of Wolf Electric Tools (Holdings) Limited for 1957 declined to £126,741 from £151,071 for 1956, after allowing for tax of £149,004 (£153,946). The ordinary dividend is maintained at 10 per cent and will be paid on May 2, to shareholders registered on April 15.

Institution of Locomotive Engineers: Summer Meeting.—The summer meeting of the Institution of Locomotive Engineers will be held in Northern Ireland and Eire from May 13 to May 15. Members will leave Euston Station, London, at 6 p.m. on Monday, May 12, and travel by the 6.20 p.m. train to Heysham for the Belfast steamer sailing at 11.40 p.m. A visit will be paid to Harland & Wolff Limited in the morning of Tuesday, May 13, and after lunch the party will travel to Dublin where the remainder of the meeting will be held.

Mechanical Handling Exhibition & Materials Handling Convention, 1958.—Details were given last week at a Press conference of the Mechanical Handling Exhibition & Materials Handling Convention, which is to be held this year at Earl's Court, London, on May 7-17. It will be, it is stated, the largest display of labour-aiding equipment and methods ever to be organised in the world. The exhibition will cover some 500,000 sq. ft. of floor space and over 250 exhibitors will be present. A film, "Mechanical Handling on Show," in colour, was also shown which gave a survey of the previous exhibition.

Morgan Crucible at Olympia.—The Morgan Crucible Co. Ltd. will display a selection from their diverse range of products which find application, or are of potential interest, to industry, at the Instruments, Electronics & Automation Exhibition, to be held at Olympia, London, from April 16-25. Morganite Resistors Limited will have its range of recently developed, and established, radio component products. Also supporting the parent company will

be Morgan Refractories Limited showing among its range pure oxide ware, large recrystallised alumina and mullite tubes and sheaths.

Railway Students' Association: Annual Convention.—The annual convention of the Railway Students' Association will be held this year in Switzerland from May 10 to May 18. The party will leave Victoria at 13.30 on Saturday, May 10, and return on the night service from Basle on Saturday, May 17.

G. D. Peters & Co. Ltd., Agents for Permadec.—G. D. Peters & Co. Ltd., of Slough, has been officially appointed as agent and distributor for Permadec flooring for use on railway and road vehicles. This product is made from impregnated densified wood to withstand severe mechanical, electrical, and chemical conditions.

G.E.C. and Lumenated Ceilings Combine Design and Development Resources.—The General Electric Co. Ltd. and Lumenated Ceilings Limited have agreed to combine design and development resources to provide a nation-wide service for the marketing and application of lumenated ceilings. An example of recent co-operation between the two companies is the 3,500-sq. ft. ceiling which provides the main illumination in the new exhibition hall of the British Motor Corporation, Longbridge, Birmingham.

Customer Research in Western Region.—British Railways, Western Region, have circularised chambers of trade and commerce, principal traders and local authorities, enclosing a questionnaire on travel. The questions have been designed so that the answers will assist in the replanning of passenger and freight services between Paddington and the West Country, which will arise as a result of the introduction of diesel traction in the Region. The scope of the inquiry covers services between Paddington and Bristol, including those which serve important centres en route; express services between Paddington and the West of England, both via Newbury and via Bristol; through express services connecting the West of England via Bristol with the North, the Midlands, and South Wales; and local travel between important centres within the area bounded by Reading, Bristol, and Penzance. Letters and questionnaires have been despatched by the district officers in London, Bristol, Exeter, and Plymouth; it is hoped that the analysis of the replies received will be available by the middle of May.

Extensions at Thos. Cook & Son Ltd. Headquarter Office.—The work of adding two extra floors on the head office building of Thos. Cook & Son Ltd., Berkeley Street, London, W.1, is nearing completion, having been begun last September. Although provision was made for the extensions when the original building was designed over 30 years ago, many technical problems had to be overcome in the present undertaking, and it is now hoped that the floors will be ready for occupation in August. It was decided in 1950 to carry out these extensions, but for several reasons the work was deferred, and it was not until 1955 that an economical project was finalised by Mr. Samuel A. S. Yeo, A.R.I.B.A. The work was submitted to tender and the contract awarded to Higgs & Hill Limited. The original building consisted of ground and four floors over part of the site, the larger and remaining



Cleaning of brickwork at Watford Junction Station, showing appearance before (right) and after treatment

area comprising six floors. This was steel framed, faced in Portland stone, and was completed in 1926. The decision to add the extra floors presented many technical problems to comply with present structural practice. The work was further complicated by the fact that the whole site area was fully covered and no space remained for builders' plant or materials, whilst the travel agency business had to continue with as little interference as possible.

George Cohen Sons & Co. Ltd. Raw Materials Division.—The new address of the Materials Division of George Cohen Sons & Co. Ltd. is Trinity Road, Kingsbury, Tamworth, Staffs. The telephone numbers are Hurley 281-2 and Ashfield 1191-3, and the telegraphic address Omniplant, Tamworth.

Birmingham Railway Carriage & Wagon Co. Ltd. Results.—An unchanged ordinary dividend of 10 per cent has been announced by the Birmingham Railway Carriage & Wagon Co. Ltd. The trading profits for 1957 advanced to £142,415 from £102,258 for 1956, and net profits increased to £91,324 (from £55,692).

Associated Lead Manufacturers Limited.—The several departments of Associated Lead Manufacturers Limited, previously housed at Finsbury Circus and Ibex House, are now re-housed together at Clements House, 14-18, Gresham Street, London, E.C.2.; tel. Monarch 4400. The Associated Lead Manufacturers Export Co. Ltd. also has moved to Clements House.

Northern Aluminium Co. Ltd.—The Birmingham Area sales office of the Northern Aluminium Co. Ltd. has removed to new premises at Devonshire House, Great Charles Street, Birmingham, 3. The office will continue, under the management of Mr. D. W. Taylor, to serve the needs of the Midland counties for all forms of Noral aluminium and aluminium alloy materials. The telephone number is changed to Central 7393, but the telegraphic address, Noralumin Birmingham, remains the same.

Four Underground Station Entrances to be Closed as Economy Measure.—Little-used subsidiary entrances to four London Transport Underground stations are to be closed either permanently or outside peak traffic hours as an economy measure. The new arrangements will start on April 8. The station entrances affected are: (1) Baker Street (Metropolitan and Circle lines), the Circle line entrance on the corner of Baker Street and Marylebone Road to be closed permanently; (2) Edgware Road (Circle and District line), the entrance on corner of Marylebone Road and Cosway Street to be open only during the rush-hours on weekdays for ticket holders, and closed at all other times, the booking office at this entrance being closed permanently; (3) London Bridge, the subway entrance to be open during peak traffic hours only; (4) Leyton, Langthorne Road entrance to be open only from 5.30 to 9.45 a.m. on weekdays.

Conveyancer Fork Trucks Limited at Mechanical Handling Exhibition, 1958.—Among the exhibits of Conveyancer Fork Trucks Limited, of Warrington, at the Mechanical Handling Exhibition, at Earl's Court, London, on May 7-17, will be recent developments in fork truck design

and handling techniques. New fork truck designs include the TC-6 (Series 4), diesel- or petrol-engined, with a capacity of 6,000 lb. at 20-in. load centre, and a two-ton capacity yard model. Both these include torque carver drive. Recently developed tilting forks will be shown on a fork reach truck which has a 2,000 lb. at 24-in. load centre and capacity. Electric powered models include the EZ-24, three-wheel 2,000 lb. at 24-in. capacity; and the FE-4, flame-proof truck, which will show forks able to handle one, two or four drums with or without pallets.

International Nickel Company of Canada.—Net earnings of the International Nickel Company of Canada for 1957 were \$86,141,000, the third highest in the history of the company. The earnings were some 10 per cent lower than in 1956. The marked decline in the price of copper had an adverse effect on earnings, in contrast to the favourable effect of the high price levels of copper in the two previous years. Reduced sales of platinum metals, lower prices for platinum, and a strike of 11 weeks duration at the Huntington, West Virginia, plant also adversely affected the earnings in 1957.

Portable Lighting Sets to Assist Sorting of Parcels on L.M. Region.—A portable electric lighting set has been produced by the London Midland Region for use at its busier passenger stations. It will assist mainly in the faster handling of parcels, newspapers and fish traffic in cases where vans are not equipped with their own lights. It can also be used for other station duties where a bright, easily moveable light is required. The set consists of a 12-v. battery in a box base, supporting a short standard on which are mounted two 12-W. lamps with individual switches. The lampholders have tough rubber cases and plastic lenses. The standard is detachable and the lamps can be turned separately to face the same or opposite directions. The complete lighting set weighs 22 lb. It provides 5 hr. light using both lamps, and is in use at Birmingham New Street and Crewe

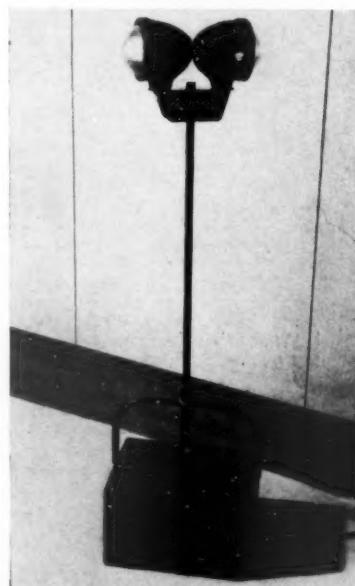
stations; the Region has ordered 150 sets for allocation to principal passenger stations. They are being made in the Chief Mechanical & Electrical Engineer's Department at Derby.

Asquith Machine Tool Fixes Issue Price.—The Asquith Machine Tool Corporation Limited has fixed the price of its "rights" issue of 1,340,000 ordinary 5s. shares at 15s. each. The shares are being offered to ordinary shareholders on a one-for-two basis.

New Mechanical Accounts Office at Chester.—British Railways, London Midland Region, opened a new mechanised central accounts office at Chester General Goods Depot on April 1, for the Chester and North Wales district. The office is equipped with punched card accounting machines and deals with goods and parcels station accounts at a lower cost and in a shorter time than hitherto. It is now possible to despatch accounts to traders four times each month, instead of monthly or bi-monthly; this facilitates the checking of railway accounts, provides earlier details of charges, and eliminates tracing work. At the end of each month a final summary account is issued. The new machines range from small card punches and verifiers to collating, sorting, interpreting, and tabulating machines.

Expansion of Chamberlain Group of Companies.—The Chamberlain group of companies, with headquarters at 3, Buckingham Palace Gardens, London, S.W.1, states that the plant sale and hire activities of Chamberlain Industries Limited, Staffa Works, Leyton, E.10, one of the Chamberlain group, are to be transferred to Chamberlain Plant Limited, a new company with offices and works at Crown Works, Southbury Road, Enfield, Middlesex. Chamberlain Plant Limited will handle the sales of Staffa mobile and shop cranes manufactured by Chamberlain Industries Limited; the Jenbach compressor, and a variety of contractors plant of a general nature. It will also operate a large plant hire fleet. Because of its association with Sanders & Forster Limited, structural engineers, also one of the Chamberlain group, Chamberlain Plant Limited will hire S. & F. Standard steel buildings to civil engineers requiring temporary storage or manufacturing accommodation.

Professional Engineers' Appointments Bureau.—The report for 1957 of the Professional Engineers' Appointment Bureau states that a steady demand for engineers of all grades was maintained during the year, although some reduction in the numbers of vacancies notified became apparent during the latter months. Enrolments with the Bureau showed no obvious fluctuations and were similar to 1956, although not as high as the two previous years. The fall in the number of vacancies has had its effect, but it is also due to a change in the type of engineers using the services of the Bureau. Placings have not been quite as high as in 1956, partly because of the decrease in more junior placings. Civil engineering especially has offered interesting and well-paid posts abroad, whereas mechanical and electrical vacancies have tended to be for design, development, and research engineers, based in the United Kingdom. The more senior vacancies are mainly managerial or administrative. Employers, the report claims, can also benefit by consultation



Portable lighting set for use on London Midland Region

with the Bureau, as prior knowledge of the supply and demand position, with the current salary levels prevailing, will often save time. As far as the Bureau was concerned, there appeared to be virtually no change in the attitude of employers to consider older men. The offices of the Bureau are now at 39, Victoria Street, London, S.W.1; the telephone number remains the same: Abbey 1737.

Forthcoming Meetings

April 8 (Tue.) to April 12 (Sat.).—Model Railway Exhibition, at the Central Hall, Westminster, S.W.1.

April 11 (Fri.).—The Railway Club, at 320, High Holborn, London, W.C.1, at 7 p.m. Paper on "The L.S.W.R. Story II—A cold welcome in Portsmouth," by Mr. K. G. Carr.

April 11 (Fri.).—Railway Correspondence & Travel Society, London Branch, at the Railway Clearing House, Eversholt Street, London, N.W.1, at 7.30 p.m. Paper on "Narrow gauge wanderings in Europe," by Messrs. G. W. Morant and H. Cuff.

April 14 (Mon.).—Institute of Transport, Metropolitan Section, at 80, Portland Place, London, W.1, at 6 p.m. Paper on "Reducing manual labour in handling raw materials and merchandise—possibilities and problems," by Mr. E. G. Whitaker.

April 14 (Mon.).—Permanent Way Institution, London Section, at the Headquarters of the British Transport Commission, 222, Marylebone Road, London, N.W.1, at 6.30 p.m. Paper (illustrated) on "High speed turnouts and crossovers," by Mr. W. A. C. White.

April 15 (Tue.).—Institution of Electrical Engineers, Measurement and Utilisation Sections, at Savoy Place, London, W.C.2, at 5.30 p.m. Papers on "A train performance computer" by Professor E. Bradshaw, M. Wagstaff, and F. Cooke. "The simulation of distributed-parameter systems, with particular reference to process control problems," by Messrs. J. F. Meredith and E. A. Freeman, and "A magnetic-drum store for analogue computing," by Messrs. J. L. Douce and J. C. West.

April 16 (Wed.).—Institution of Locomotive Engineers, at the Institution of Mechanical Engineers, at 1, Birdcage Walk, Westminster, S.W.1, at 5.30 p.m. Paper on "Steel for railway purposes," by Mr. J. Dearden, Assistant Superintendent, Metallurgy Division, Research Department, British Railways, Derby, and Mr. J. E. Roberts, Research Department, Colvilles Limited, Motherwell.

April 16 (Wed.).—Railway Correspondence & Travel Society, West Riding Branch, at the Talbot Hotel, Kirkgate, Bradford, at 7.30 p.m. Paper on "Early history of the steam locomotive to circa 1850," by Mr. C. A. Hill.

April 17 (Thu.).—Institution of Mechanical Engineers, Applied Mechanics Group, at 1, Birdcage Walk, Westminster, S.W.1, at 6 p.m. Discussion: "Training in engineering design."

April 19 (Sat.).—Permanent Way Institution, Manchester & Liverpool Section, at the Manchester College of Science & Technology, Sackville Street, Manchester, at 2.30 p.m. Paper on "Factors in the running of a high

speed train service," by Mr. O. S. Nock.

April 19 (Sat.).—Permanent Way Institution, East Anglia Section, at Cambridge, at 2.15 p.m. Paper on "Long welded rails," by Mr. J. Game.

Railway Stock Market

Stock markets have again made only restrained response to good news, because there is still a widespread feeling that the outlook cannot be viewed confidently until the American trade recession is halted. There is talk in the City that the bank rate may be further reduced to 5 per cent in the near future, and hopes persist that the Budget may bring tax concessions.

There were again only minor changes in foreign rails. Antofagasta ordinary eased from 16 to 15½ and the preference stock lost a point at 34½; the 5 per cent (Bolivia) debentures were 94½. Chilean Northern 5 per cent debentures kept at 35. Costa Rica ordinary stock was again 17 with the 6½ per cent first debentures 71½. Brazil Railway bonds were again quoted at 5, while International of Central America common shares were \$21½ and Paraguay Central prior debentures 11½. San Paulo Railway 3s. units kept at 2s. 1½d., while United of Havana second income stock remained at 6 and the consolidated stock was 1½. Mexican Central "A" bearer debentures were 68½. Peru Transport "B" shares eased to \$2½.

Canadian Pacifics displayed their usual activity and strengthened fractionally to \$46½.

On the other hand, the preference stock eased from 54 to 53½ and the 4 per cent debentures were 65, compared with 65½ a week ago.

In other directions, Nyasaland Railways shares have again been quoted at 9s. 9d. with the 3½ per cent debentures 60½. Midland of Western Australia ordinary stock was 6½ with the income debentures 14½.

Imperial Chemical were prominent with an advance of nearly 4s. to 43s. 9d. in response to the group's record results, the increase in dividend from 10 per cent to 12 per cent, and the decision to distribute a free scrip issue of 50 per cent. This was taken by the City to show confidence, though the directors point out that the increase in capital resulting from the scrip issue should not be taken as indicating future dividend policy. The inference, however, is that the directors feel that the group has scope for further big expansion as time progresses.

The I.C.I. dividend helped sentiment in the industrial market, and the better tendency in shares of locomotive builders and engineers was maintained. G. D. Peters at 30s. remained under the influence of the recently-announced increased dividend. Moreover, further consideration of the results and the maintained 10 per cent dividend put Birmingham Wagon shares higher; they were 17s. 9d., compared with 17s. a week ago. Charles Roberts 5s. shares strengthened further to 8s. 6d. though in other directions, Beyer Peacock came back to 7s. 1½d. Gloucester Wagon 10s. shares were 13s. 3d. and Wagon Repairs 5s. shares were 11s. 7½d. Westinghouse Brake were quite well maintained at 36s. 3d. Hurst Nelson at 34s. 6d. were virtually the same as last week, while North British Locomotive have remained more active, and rose afresh from 13s. 1½d. to 13s. 9d.

Pressed Steel 5s. shares became strong and active on the good results and higher dividend, and on balance advanced from 13s. 10½d. to 15s. 4½d. The 10s. shares of the Dowty Group rose to 34s. 3d., but the lower profits put British Aluminium back sharply from 47s. 3d. a week ago, to 45s. British Oxygen eased to 33s. 9d., T. W. Ward were little changed at 75s., Ruston & Hornsby steady at 26s., but Associated Electrical came back sharply from 51s. 3d. to 49s. on new issue talk, though it is not generally believed there are any early plans for this. General Electric eased from 31s. 9d. to 30s. 6d. and English Electric from 52s. 3d. a week ago to 51s. 6d.

OFFICIAL NOTICES

London Transport require ENGINEERING ASSISTANT for technical work connected with incentive bonus schemes for permanent way work. Qualifications—good standard of technical training; drawing office experience; some knowledge of permanent way work advantageous; Higher National Certificate or study towards such qualification desirable. Salary range, £790-£880. Medical examination; free travel; applications within 7 days to Staff and Welfare Officer (F/EV 680), London Transport, 55 Broadway, S.W.1.

BRAITHWAITE & CO. (INDIA) LIMITED, Clive Works, Kidderpore, Calcutta 23, Bridge and Structural Engineers and railway carriage and wagon builders, have vacancies for SENIOR and JUNIOR WAGON DRAUGHTSMEN. Only Indian nationals on their return to India who have taken or are at present undertaking training with a reputed coach and wagon building firm in Britain or on the Continent will be considered. Depending on age, training and experience, appointments will qualify either at once or after a suitable period for covenanted status. Applications may be addressed direct to the company or through Braithwaite & Co., Engineers, Limited, Dorland House 14-16 Regent Street, London, S.W.1.

THE REPUBLIC OF THE SUDAN.—Sudan Railways require a SIGNAL AND TELEGRAPH ENGINEER for service in the Sudan, age 28-45 years. Candidate must have considerable experience and practical knowledge of the maintenance and installation of railway signalling and tele-communications system and be capable of preparing all necessary estimates and drawings. Preference will be given to candidates who are members or Associate Members of the Institution of Railway Signal Engineers or an Institution of similar status. Candidates must know Arabic or English up to a standard which would enable them to carry out the duties of the post. Applicant will be appointed on Short Term Contract (with bonus) for three years determinable at any time by three months' notice from either side. A bonus of one month's salary is payable for each year of service, subject to a maximum of six months' salary. The salary scale ranges from £5 1075 to £5 1675 per annum (annual increments). The starting rate will be fixed according to age, experience and qualifications. Cost of Living Allowance which is reviewed quarterly is payable. Outfit Allowance of £5 50 is payable when contract is signed. Full details and forms of application obtainable from the Sudan Embassy, Personnel Section, 3, Cleveland Row, St. James's, London, S.W.1. Quoting reference Signal and Telegraph Engineers 4/1925. Closing date, 30th April, 1958.

THE India Supply Mission, Washington, invites tenders for the supply of: 4,000 long tons (a) FISH PLATES for 90 lb. rails; 13,000 long tons (b) MILD STEEL PLATES. Forms of tender may be obtained from the Director General, India Store Department, Government Building, Bromyard Avenue, Acton, London, W.3. Tenders are to be posted direct to India Supply Mission, 2536 Massachusetts Avenue, N.W., Washington 8, D.C., to reach there by 9.15 a.m. on 30th April, 1958. Please quote reference No. S.5107/57.CB/RLY.

THE Director General of India Store Department, Government Building, Bonnard Avenue, Acton, London, W.3, invites tenders for the supply of: 165 Sets SUPER HEATER ELEMENT, complete with all fittings (1st to 5th Row) but without bolts and nuts and washer for BG Loco Boilers WG. Forms of tender may be obtained from the above address on or after 4th April, 1958, at a fee of 10s. which is not returnable. If payment is made by cheque, it should please be made payable to "High Commissioner for India." Tenders are to be delivered by 2 p.m. on Thursday, 15th May, 1958. Please quote Reference No. 132/57.DB/RLY.2.

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